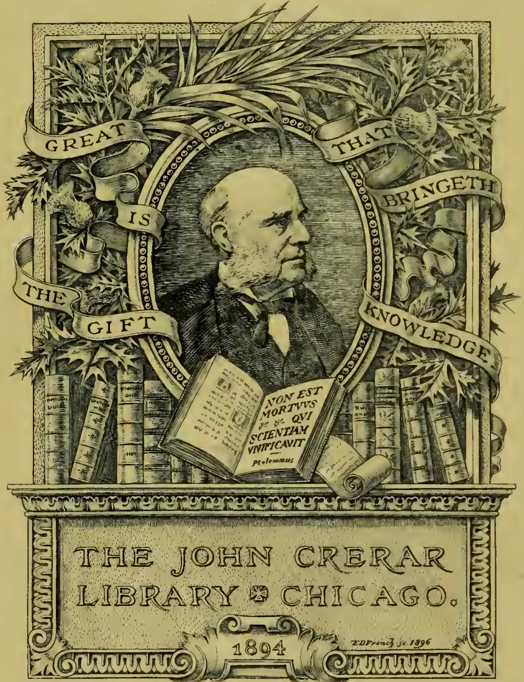

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University Bulletins Series 3 No. 4

OHIO STATE UNIVERSITY

The College of Engineering

Its Courses of Instruction,
Buildings, and
Equipment

COLUMBUS
PUBLISHED BY THE UNIVERSITY
JULY, 1898
Entered at the Postoffice at Columbus, Ohio, as second-class matter

4F

The Ohio State University

Under an act of Congress passed July 2, 1862, the State of Ohio received from the United States a large grant of the public lands for the purpose of establishing a "college where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such a manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In accordance with this act, the Ohio State University was founded by the State as a public institution of learning. The governing body of the institution is a Board of Trustees, appointed by the Governor of the State for terms of seven years, as provided in the law organizing the University. The original endowment has been supplemented, and the objects of the University promoted, by a permanent annual grant from the United States, under an act of 1890, by special appropriations of the General Assembly; and in 1891, by a permanent annual grant from the State, which grant was doubled by the Legislature of 1896. In accordance with the spirit of the law under which it is organized, the University aims to furnish ample facilities for education in the liberal and industrial arts, the sciences and the languages, and for thorough technical and professional study of agriculture, engineering in its various departments, veterinary medicine, pharmacy and law. Through the aid which has been received from the United States and from the State it is enabled to offer its privileges, with a slight charge for incidental expenses, to all persons of either sex who are qualified for admission.

The University is situated within the corporate limits of the city of Columbus, two miles north of the Union Depot and about three miles from the State Capitol. The University grounds consist of three hundred and thirty acres.

It may be reached by either the North High Street or Neil Avenue electric cars. Those wishing to go to the principal buildings of the University or to the residences on the grounds, should take a High Street car going north. Those wishing to visit the Veterinary Hospital, Agricultural and Horticultural buildings, or the Dormitories, will find the Neil Avenue cars more convenient.

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Days and Dates

1898

Entrance Examinations (8 A. M.) and registration	Tuesday, Wednesday,	Sept. 13. Sept. 14.
Lectures and and Class-work begin (all Colleges)	Thursday,	Sept. 15.
Meeting of Trustees	Wednesday,	Sept. 21.
Thanksgiving Recess	Thursday, Friday,	Nov. 24. Nov. 25.
First Term ends	Wednesday,	Dec. 21.
Christmas Vacation.		

1899

Second Term begins	Wednesday,	Jan. 4.
University Day	Wednesday,	Feb. 22.
Second Term ends	Friday,	March 24.
Third Term begins	Monday,	March 27.
Spring Recess.		
Meeting of Trustees	Wednesday,	April 5.
High School Day	Friday,	May 19.
Senior Vacation begins	Saturday,	May 20.
Field Day—Athletic Association	Saturday,	May 20.
Memorial Day	Tuesday,	May 30.
Competitive Drill—Cadet Battalion	Saturday,	June 3.
Final Examinations	Monday to Friday,	June 5. June 9.
Baccalaureate Sermon	Sunday,	June 11.
Entrance Examinations (8 A. M.)	Monday, Tuesday,	June 12. June 13.
Class Day	Monday,	June 12.
Meeting of Trustees	Tuesday,	June 13.
Alumni Day	Tuesday,	June 13.
COMMENCEMENT	Wednesday,	June 14.
Summer Vacation.		
Entrance Examinations (8 A. M.) and Registration	Tuesday, Wednesday,	Sept. 12. Sept. 13.
Lectures and Class-work begin (all Colleges)	Thursday,	Sept. 14.
Meeting of Trustees	Wednesday,	Sept. 20.

THE UNIVERSITY

The Ohio State University is divided into six colleges, as follows:
The College of Agriculture and Domestic Science.
The College of Arts, Philosophy and Science.
The College of Engineering.
The College of Law.
The College of Pharmacy.
The College of Veterinary Medicine.

Each of the above named colleges is under the direction of its own Faculty, which has power to act in all matters pertaining to the work of students in that particular college.

The aim of the University is to give to the young men and women of Ohio the largest possible opportunity for both general and special training, in order to prepare them for the various duties of life.

THE COLLEGE OF ENGINEERING

Since the inception of the University, the College of Engineering has manifested a vigorous and steady growth. To a large extent this growth represents the demands of the people from whom the University derives its support, for it has been the constant policy of the University to enlarge and foster each branch of educational work in response to every intelligent and effective demand.

Yet it is entirely true that the State has advanced and shaped public opinion by providing educational facilities somewhat in advance of public demand. Through its University it has thus established and built up a system of technical education which is more important than any other single agency in the development of the commercial and industrial interests of Ohio. The marvelous industrial progress made in this State and country in recent years is the best indication of the benefits which have already begun to accrue from the enlargement of technical training, and from its constant subdivision and expansion.

At present the Engineering College comprises nine principal lines of work, viz.: Civil, Mining, Mechanical, Electrical, and Ceramic Engineering; Industrial Arts, Chemistry, Metallurgy, and Architecture. Covering these are offered seven four-year courses leading to degrees; and four other shorter courses not leading to degrees. On completion of these shorter courses, certificates are issued setting forth the work accomplished.

The instruction necessary to the completion of these various courses of study is given in seventeen different departments, under forty-five professors and assistants. In addition, in some of the courses in this College elective work is offered, which may be taken from any of the thirty-five departments of the University.

The various departments of the College of Engineering, or shared by this College, occupy about two-thirds of Chemical Hall, nearly the whole of Hayes Hall, the whole of the Mechanical and Electrical buildings, and portions of Orton Hall and of the main University building. The equipment for teaching technical and scientific subjects is, in the main, excellent, and in some departments is exceptional. In all departments the annual increase in apparatus and facilities is rapidly making the equipment more perfect and complete.

The Library of the University, consisting of about 25,000 volumes and 10,000 unbound publications, is able to fill the demands of the Engineering students for the most important treatises in their respective fields of science.

FACULTY OF THE COLLEGE OF ENGINEERING

JAMES HULME CANFIELD, M. A., LL. D. .... University Grounds
President

NATHANIEL WRIGHT LORD, E. M., DEAN .... 338 West Eighth avenue
Professor of Metallurgy and Mineralogy and Director of the School of Mines

EDWARD ORTON, PH. D., LL. D. .... 100 Twentieth street
Professor of Geology

SIDNEY AUGUSTUS NORTON, PH. D., LL. D. .... 363 East Town street
Lecturer in Chemistry

BENJAMIN FRANKLIN THOMAS, PH D .... University Grounds
Professor of Physics

ROSSER DANIEL BOHANNAN, B. SC., C. E, E. M .... 16th and Indianola avenues
Professor of Mathematics

C. NEWTON BROWN, C. E .... 1343 Forsythe avenue
Professor of Civil Engineering

ERNEST AUGUST EGGERS .... University Grounds
Professor of the German Language and Literature

BENJAMIN LESTER BOWEN, PH. D. .... 46 Jefferson avenue
Professor of the Romance Languages and Literatures

JOSEPH VILLIERS DENNEY, B. A. .... The Dennison
Professor of Rhetoric and the English Language

*ARTHUR LYMAN WILLISTON, SC. B ....
Director of the Department of Industrial Arts

EDWARD ORTON, JR, E. M., SECRETARY .... The Normandie
Director of the Department of Clay-Working and Ceramics

WILLIAM T. MAGRUDER, M. E .... 329 West Eighth avenue
Professor of Mechanical Engineering

JOSEPH NELSON BRADFORD, M. E. .... 54 West Tenth avenue
Associate Professor of Drawing

WILLIAM McPHERSON, JR., D. SC. .... University Grounds
Professor of Chemistry

HENRY CURWEN LORD, B. SC ....
Director of the Emerson McMillin Observatory and Associate Professor of Astronomy

FRANK ARNOLD RAY, E. M .... The Dennison
Associate Professor of Mine Engineering

EMBURY ASBURY HITCHCOCK, M. E. .... W. Eighth avenue
Associate Professor of Experimental Engineering

FRANCIS CARY CALDWELL, B. A., M. E. .... 100 West Eighth avenue
Associate Professor of Electrical Engineering

GEORGE WASHINGTON McCOARD, M. A. .... 319 West Fifth avenue
Assistant Professor of Mathematics

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*Resigned

JAMES ELLSWORTH BOYD, M. Sc.... ....25 Maynard avenue
Assistant Professor of Physics

CHRISTOPHER ELIAS SHERMAN, C. E.............................. .....770 Oak street
Assistant Professor of Civil Engineering

JOHN ADAMS BOWNOCKER, B. Sc .... 1594 Neil avenue
Assistant Professor of Geology

CHARLES WILLIAM FOULK, B. A......................... ....41 Eleventh avenue
Assistant Professor of Analytical Chemistry

CHARLES WALTER MESLOH, M. A..................Cor. High street and Eleventh avenue
Assistant Professor of the German Language and Literature

JOSEPH RUSSELL TAYLOR. B. A...86 King avenue
Assistant Professor of Rhetoric

CHARLES LINCOLN ARNOLD, M. Sc..............................239 West Tenth avenue
Assistant in Mathematics

CHARLES WILLIAM WEICK, B. Sc...... .. .. 30 East Ninth avenue
Assistant in the Industrial Department and Instructor in Pattern Making and Founding

WILLIAM ABNER KNIGHT......................... .... 206 West Lane avenue
Assistant in the Industrial Department and Instructor in Machine Work

CHARLES CONRAD SLEFFEL..................................174 West First avenue
Assistant in the Industrial Department and Forge-Master

THOMAS EWING FRENCH, M. E.................. ....1458 Worthington street
Assistant Professor of Drawing

KARL DALE SWARTZEL, M. Sc....................................57 West Frambes avenue
Assistant in Mathematics

*CHARLES A. BRUCE, B. A................... ....234 West Tenth avenue
Assistant in French

WILLIAM LUCIUS GRAVES, B. A .... Forsythe avenue
Assistant Professor of Rhetoric and the English Language

THOMAS KENYON LEWIS, B. Sc ....68 East Seventh avenue
Assistant in Drawing

FRANK HAAS, C. E., E. M ....233 Eleventh avenue
Assistant in Mining and Metallurgy

RAYMOND M. HUGHES, M. Sc.......... ....169 King avenue
Assistant in Ceramics

FREDERICK EDWARD KESTER, M. E...................................1473 Neil avenue
Assistant in Physics

FRED ALAN FISH, M. E...................................... ...229 W. Eleventh avenue
Fellow, and Laboratory Assistant in Electrical Engineering

MURRAY P. BRUSH, A. B..East Broad street
Assistant in French

ROBERT FISCHER, M. PH..810 Franklin avenue
Fellow, and Laboratory Assistant in Chemistry

JOHN HERBERT FOX, M. E.......... ....199 West Eleventh avenue
Fellow, and Laboratory Assistant in Industrial Arts

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*Absent on leave

HORACE JUDD, M. E.. ....22 West Woodruff avenue
Fellow, and Laboratory Assistant in Mechanical Engineering

FREDERICK JAMES HALE, M. E ....212 Tenth avenue
Fellow, and Laboratory Assistant in Mechanical Engineering

JOHN THOMAS MARTIN....................... ....1194 Fair avenue
Professor of Military Science and Tactics

ROBERT IRVING FULTON ....Delaware, Ohio
Professor of Elocution and Oratory

OLIVE BRANCH JONES. ....53 Eleventh avenue
Librarian

CLARENCE P. LINHART..Park Hotel
Director of the Gymnasium

COURSES OF STUDY IN THE COLLEGE OF ENGINEERING

The following Courses of study lead to the degrees indicated in each case:

1. The Course of Civil Engineering, to the degree of Civil Engineer (C. E.).
2. The Course in Mining Engineering, to the degree of Engineer of Mines (E. M.).
3. The Course in Mechanical Engineering, to the degree of Mechanical Engineer (M. E.).
4. The Course in Electrical Engineering, to the degree of Mechanical Engineer in Electrical Engineering (M. E.).
5. The Course in Ceramics and Clay Working, to the degree of Engineer of Mines in Ceramics (E. M.).
6. The Course in Industrial Arts, to the degree of Bachelor of Science in Industrial Arts (B. Sc.).
7. The Course in Chemistry, to the degree of Bachelor of Science in Chemistry or Metallurgy (B. Sc.).

The following short courses do not lead to a degree, but students completing them are furnished with certificates:

8. The Course in Architecture—three years.
9. The short Course in Mining—two years.
10. The short Course in Clay Working—two years.
11. The short Course in Industrial Arts—two years.

COURSE IN CIVIL ENGINEERING

This Course is arranged for students expecting to become surveyors or civil engineers. The plan of the course is to give (1) a thorough training in mathematics and mechanics, (2) the general principles underlying all branches of civil engineering, (3) the application of the general principles to the several branches of civil engineering. The subjects of land, railroad and topographical surveying are important features, and students can at once begin practical work. In the engineering work special attention is given to iron and steel bridge work, masonry construction and cement testing, road and railroad building and maintenance, water supply and the subject of the collection and disposal of sewage.

NOTE—The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credis hourt
Drawing (1) Freehand	2	Drawing (1) Freehand	2	Drawing (2) Lettering	3
French (1) or German (1)	4	French (1) or German (1)	4	French (1) or German (1)	4
Gen. Chemistry (7) Inorganic	5	Gen. Chemistry (7) Inorganic	5	Metallurgy (2) Mineralogy	3
Mathematics (14) Trigonometry	5	Mathematics (15), (16) Trigonometry, Algebra	2, 3	Mathematics (17) Plane Analytics	5
Rhetoric (1) Paragraph writing	2	Rhetoric (1) Theme Writing	2	Rhetoric (1) Prose Analysis	2
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Civil Engineering (1) Surveying	6	Civil Engineering (4) C. E. Drawing	4	Civil Engineering (2) Surveying	6
Drawing (3) Projections	3	Drawing (3) Descriptive Geometry	5	Drawing (3) Shades, Shadows and Per	3
Mathematics (18) Space Analy. and Calculus	5	Mathematics (19) Calculus	5	Mathematics (20) Calculus	5
Physics (2) Mechanics and Heat	3	Physics (2) Electricity and Magnetism	3	Physics (2) Light and Sound	3
Cadet Service		Cadet Service		Cadet Service	

VOLUNTARY

French (3)	2	or German (2) Each for the year	2	or Rhetoric (4)	2

THIRD YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Civil Engineering (3) Surveying	4	Civil Engineering (5) C. E. Drawing	3	Astronomy (2) Mathematical	4
Geology (2) General	5	Civil Engineering (6) Stereotomy	4	Civil Engineering (7) Bridge Strains	5
Mathematics (8) Least Squares	2	Geology (2) General	5	Drawing (7) Photography	2
Mech. Engineering (6) Mechanics	5	Mech. Engineering (6) Mechanics	5	Mech. Engineering (7) Strength of Materials	5
Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2

FOURTH YEAR

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Astronomy (2) Mathematical	4	Civil Engin'g (16) or (17) Masonry, Railways	5	Civil Engineering (10) Sanitary Engineering	5
		Civil Engineering (14) Testing Laboratory	2		
Civil Engineering (8) Bridge Designing	5	Civil Engineering (18) Water Supply	5		
Civil Engineering (15) Masonry	5	Elec. Engineering Laboratory (6) Laboratory (7)	 2 2	Geology (3) Economic	5
Elec. Engineering Laboratory (6) Laboratory (7)	 2 2	Mech. Engineering (17) Laboratory	3	Mech. Engineering (25) Laboratory	3

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of this study must lie within the field of Civil Engineering. The subject must be announced to the President of the University (dependent upon the approval of the head of the Department) not later than the beginning of the second term of the Senior Year, and the completed thesis must be submitted not later than the second Saturday before Commencement Day.

COURSE IN MINING ENGINEERING

This Course is arranged for students intending to become mining engineers and surveyors, metallurgical or technical chemists. The plan of work, therefore, while keeping mathematics, drawing and engineering prominent, also provides extended work in applied chemistry, chemical analysis, assaying, mineralogy, geology, and surveying with especial application to mines and underground work, while the treatment of ores, both mechanical in ore dressing and chemical in metallurgy, forms an important feature.

Note—The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Drawing (1) Freehand	2	Drawing (1) Freehand	2	Drawing (2) Lettering	3
French (1) or German (1)	4	French (1) or German (1)	4	French (1) or German (1)	4
General Chemistry (7) Inorganic	5	General Chemistry (7) Inorganic	5	Metallurgy (2) Mineralogy	3

FIRST YEAR—CONTINUED.

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Mathematics (14) Trigonometry	5	Mathematics (15) (16) Trigonometry Algebra	2 3	Mathematics (17) Plane Analytics	5
Rhetoric (1) Paragraph Writing	2	Rhetoric (1) Theme Writing	2	Rhetoric (1) Prose Analysis	2
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Drawing (3) Projections	3	Drawing (3) Descriptive Geometry	3	Drawing (3) Shades, Shadows and Per.	3
Mathematics (18) Analytics and Calculus	5	Mathematics (19) Calculus	5	Mathematics (20) Calculus	5
Metallurgy (5) Laboratory	5	Metallurgy (5) Laboratory	5	Metallurgy (5) Laboratory	5
Physics (2) Mechanics and Heat	3	Physics (2) Electricity and Magnetism	3	Physics (2) Light and Sound	3
Shopwork (1) Woodwork	2	Shopwork (2) Forging	2	Shopwork (4) Chipping and Filing	2
Cadet Service		Cadet Service		Cadet Service	

VOLUNTARY

French (3)	2	or German (2) Each for the year	2	or Rhetoric (4)	2

THIRD YEAR

Mech. Engineering (6) Mechanics	5	Mech. Engineering (6) Mechanics	5	Mech. Engineering (7) Strength of Materials	5
Metallurgy (4) Fuels and Iron	5	Metallurgy (4) Steel, Copper, Gold, etc.	5	Civil Engineering (19) Bridge Strains	5
Mine Engineering (4) Mine Surveying	5	Metallurgy (6) Assaying	5	Metallurgy (3) Deter Mineralogy	5
Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2

FOURTH YEAR

Elec. Engineering (6) Laboratory (7)	2 2	Elec. Engineering (6) Laboratory (7)	2 2	Geology (3) Economic	5
Geology (2) General	5	Geology (2) General	5	Mine Engineering (6) Plans and Specifications	5
Mine Engineering (5) Mine Engineering	5	Metallurgy (7) Metal. Construction	3	Mine Engineering (5) Mine Engineering	5
Metallurgy (8) Ore Dressing	2	Mine Engineering (5) Mine Engineering	5	Drawing (7) Photography	2

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of such study must lie within the field of Metallurgy or of Mine Engineering. The subject must be announced to the President of the University (dependent upon the written approval of the head of the department) not later than the beginning of the second term of the Senior Year; and the completed thesis must be submitted not later than the second Saturday before Commencement Day.

COURSE IN MECHANICAL ENGINEERING

This Course has for its first object the qualifying of men for the mechanical engineering profession. It aims to embrace preparation for such lines of pursuit as the successful management of machinery in manufacturing establishments; the superintendence of construction; the designing and laying out of machinery plants for mills and factories; the construction of machines for particular purposes, and the designing and drawing of the same, the making of calculations respecting strength, shocks, proportion, endurance, and suitability of material for specific purposes.

NOTE—The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (1) Freehand	2	Drawing (1) Freehand	2	Drawing (2) Lettering	3
French (1) or German (1)	4	French (1) or German (1)	4	French (1) or German (1)	4
Gen. Chemistry (7) Inorganic	5	Gen. Chemistry (7) Inorganic	5	Shopwork (1) Carpentry and Pat'n Mak'g	4
Mathematics (14) Trigonometry	5	Mathematics (15) (16) Trigonometry Algebra	2, 3	Mathematics (17) Plane Analytics	5
Rhetoric (1) Paragraph Writing	2	Rhetoric (1) Theme Writing	2	Rhetoric (1) Prose Analysis	2
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Drawing (3) Projections	3	Drawing (3) Descr. Geometry	3	Drawing (3) Shades, Shadows and Per.	3
Mathematics (18) Analytics and Calculus	5	Mathematics (19) Calculus	5	Mathematics (20) Calculus	5
Physics (2) Mechanics and Heat	3	Physics (2) Electricity and Magnetism	3	Physics (2) Sound and Light	3

SECOND YEAR—CONTINUED.

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
		Physics (7) Laboratory	2	Physics (7) Laboratory	3
Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2
Shopwork (2, 3) Forging and Foundry	5	Shopwork (4) Chipping and Filing	3	Shopwork (5) Machine work	3
Cadet Service		Cadet Service		Cadet Service	

VOLUNTARY

French (3)	2	or German (2)	2	or Rhetoric (4)	2

Each for the year

THIRD YEAR

Drawing (5) Technical	3	Mech. Engineering (6) Mechanics	5	Drawing (7) Photography	2
Mathematics (11) Differential Equations	1	Mech. Engineering (22) Timber and Masonry	3	Civil Engineering (19) Bridge Strains	5
Mech. Engineering (6) Mechanics	5	Mech. Engineering (3) Mechanism	5	Mech. Engineering (7) Strength of Materials	5
Metallurgy (4) Fuels and Iron	5	Metallurgy (4) Steel	2		
Shopwork (6) Advanced Machine Work	3	Shopwork (6) Advanced Machine Work	4	Mech. Engineering (3) Mechanism	2
Mech. Engineering (12) Laboratory	2			Industrial Arts (6) Machine Design	5

FOURTH YEAR

Elec Engineering (6) Laboratory (7)	2 2	Elec. Engineering (6) Laboratory (7)	2 2	Industrial Arts (5) Shop Appliances	2
Mech. Engineering (13) Laboratory	4			Mech. Engineering (10) Steam Boilers	5
Mech. Engineering (8) Thermodynamics	5	Mech. Engineering (9) Prime Movers	5	Mech. Engineering (15) Laboratory	3
		Mech. Engineering (14) Laboratory	4	Mech. Engineering (20) Hydraulic Mach.	2
Mech. Engineering (18) Mach. Design	5	Mech. Engineering (18) Mach. Design	5	Mech. Engineering (21) Thesis Work	5

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of such study must lie within the field of Mechanical Engineering. The subject must be announced to the President of the University (dependent upon the written approval of the head of the department) not later than the beginning of the second term of the Senior Year, and the completed thesis must be submitted not later than the second Saturday before Commencement Day.

COURSE IN ELECTRICAL ENGINEERING

The object of this Course is to prepare students for the various pursuits in which the applications of electricity are prominent. Physics, especially theoretical and applied electricity, and mechanical engineering are naturally the leading subjects of the Course. General theory is treated in ample breadth, and is tested by experiments in well equipped laboratories. The laboratories are so conducted as to afford the student a degree of facility in the use of instruments and machinery only acquired by continued practice.

NOTE—The Figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows this statement of Courses

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (1) Freehand	2	Drawing (1) Freehand	2	Drawing (2) Lettering	3
French (1) or German (1)	4	French (1) or German (1)	4	French (1) or German (1)	4
Gen. Chemistry (7) Inorganic	5	Gen. Chemistry (7) Inorganic	5	Shop Work (1) Carpentry and Pat'rn Mak'g	4
Mathematics (14) Trigonometry	5	Mathematics (15), (16) Trigonometry, Algebra	2, 3	Mathematics (17) Plane Analytics	5
Rhetoric (1) Paragraph Writing	2	Rhetoric (1) Theme Writing	2	Rhetoric (1) Prose Analytics	2
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Drawing (3) Projections	3	Drawing (3) Descriptive Geometry	3	Drawing (3) Shades, Shadows and Per	3
Mathematics (18) Analytics and Calculus	5	Mathematics (19) Calculus	5	Mathematics (20) Calculus	5
Physics (2) Mechanics	3	Physics (2) Electricity, Magnetism	3	Physics (2) Light, Sound	3
Physics (3) Problems	2	Physics (3) Problems	2	Physics (3) Problems	2
Shopwork (2) Forging	2	Physics (5) Laboratory	3	Physics (5) Laboratory	3
Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2
Shopwork (4) Chipping and Filing	2	Shopwork (4) Machine Work	2		
Cadet Service		Cadet Service		Cadet Service	

VOLUNTARY

French (3)	2	or German (2) Each for the year	2	or Rhetoric (4)	2

THIRD YEAR

First Term	Credit hours	Second Term	Credit hours	Thire Term	Credit hours
Drawing (5) Technical	3	Shopwork (6) Advanced Machine Work	4	Industrial Arts (6) Machine Design	5
Mathematics (11) Differential Equations	1	Mech. Engineering (3) Mechanism	5	Mech. Engineering (16) Laboratory	4
Mech. Engineering (6) Mechanics	5	Mech. Engineering (6) Mechanics	5	Mech. Engineering (7) Strength of Materials	5
Physics (6) Laboratory	5	Physics (6 Laboratory	5	Physics (6) Laboratory	5
Physics (4) Electricity and Magnetism	3				

FOURTH YEAR

Elec. Engineering (2) Elec. Machinery	5	Elec. Engineering (2) Elec. Machinery	5	Elec. Engineering (2) Elec. Machinery	5
Elec. Engineering (3) Designing and Drawing	3	Elec Engineering (3) Designing and Drawing	3	Elec. Engineering (3) Designing and Drawing	3
Elec. Engineering (4) Laboratory	5	Elec. Engineering (4) Laboratory and Thesis	5	Elec. Engineering (4) Laboratory and Thesis	5
Mech. Engineering (8) Thermodynamics	5	Mech. Engineering (9) Prime Movers	5	Mech. Engineering (10) Steam Boilers	5

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the result of a special study. The subject of such study must lie within the field of Electrical Engineering. The subject must be announced to the President of the University (dependent upon the written approval of the head of the Department) not later than the beginning of the second term of the Senior Year, and the completed thesis must be submitted not later than the second Saturday before Commencement Day.

THE COURSE IN CERAMICS

This Course is designed to create a class of engineers who shall be fitted to render to the Clay, Glass and Cement Industries, the same kind of services which have long been rendered to Mining and Metallurgical Industries by graduates of Schools of Mines.

The problems of the Ceramic Industries are not unlike those of the Mining Industries, either in kind or in adaptation to methods of technical control; but the information and scientific equipment necessary to solve these problems successfully are peculiar to those industries alone, and in the past have received little or no attention from technical schools in this country.

This course is offered with the hope of filling this long standing gap in the scheme of engineering education in this country. It is essentially an Engineering Course, following closely the lines of the other engineering courses, up to the end of the second year. In the last two years, the training specializes along the lines of Ceramics and of the application of Chemistry to this subject.

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (1) Freehand	2	Drawing (1) Freehand	2	Drawing (2) Lettering	3
Gen. Chemistry (7) Inorganic	5	Gen. Chemistry (7) Inorganic	5	Metallurgy (2) Mineralogy	3
German (1) Elementary	4	German (1) Elementary	4	German (1) Elementary	4
Mathematics (14) Trigonometry	5	Mathematics (15), (16) Trigonometry Algebra	2, 3	Mathematics (17) Plane Analytics	5
Rhetoric (1) Paragraph Writing	2	Rhetoric (1) Theme Writing	2	Rhetoric (1) Prose Analysis	2
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Ceramics (1)	5	Ceramics (2)	5	Ceramics (3)	5
	(Chemical Laboratory extending through year)				
Drawing (3) Projections	3	Drawing (3) Descriptive Geometry	3	Drawing (3) Shades, Shadows and Per.	3
Mathematics (18) Analytics and Calculus	5	Mathematics (19) Calculus	5	Mathematics (20) Calculus	5
Physics (2) Mechanics and Heat	3	Physics (2) Electricity and Magnetism	3	Physics (2) Light and Sound	3
Shopwork (1) Woodwork	2	Shopwork (2) Forging	2	Shopwork (4) Chipping and Filing	2
Cadet Service		Cadet Service		Cadet Service	

VOLUNTARY

French (3)	2	or German (2) Each through the year	2	or Rhetoric (4)	2

THIRD YEAR

Ceramics (4) General Principles	5	Ceramics (5) Bricks	5	Ceramics (6) Pottery	5
Mine Engineering (4) Mine Surveying	5	Ceramics (7) Advanced Chemical Laboratory Work	5	Ceramics (8) Advanced Chemical Laboratory Work	5
Mech. Engineering (6) Analytic Mechanics	5	Mech. Engineering (6) Analytic Mechanics	5	Mech. Engineering (7) Strength of Materials	5
Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2

FOURTH YEAR

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Ceramics (9) Manufacture of Bodies	5	Ceramics (10) Glasses and Glazes	5	Ceramics (11) Enamels and Colors	5
Drawing (7) Photography	2	Ceramics (12) Cement	5		
Geology (2) General	5	Ceramics (13) Ceramic Construction	2	Ceramics (15) Thesis Work	5
Metallurgy (4) Fuels and Iron	5	Ceramics (14) Reports on Clay Prop.	5	Geology (3) Economic	5

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of this study must lie within the field of Ceramic Engineering. The subject must be announced to the President of the University (dependent upon the approval of the head of the Department), not later than the beginning of the second term of the Senior Year; and the completed thesis must be submitted not later than the second Saturday before Commencement Day.

COURSE IN INDUSTRIAL ARTS

The primary object of this Course is to provide facilities for training those who wish to become teachers of Manual Training. The Course is also designed for those who purpose entering the various branches of manufacture and industry, not as engineers, but as practical managers, superintendents or business men. The plan of the Course is to combine with a general science training, a large amount of drawing and shop work, in which the underlying principles and methods employed in the various branches of industry are dwelt on. The aim is educational as well as professional—the training of the mind as well as the hand. Considerable liberty of election is permitted, and by a proper choice of the elective studies offered, the student may obtain a training which will open the way to a wide range of occupations.

Note—The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows the statement of Courses.

FIRST YEAR

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Drawing (1) Freehand	1	Drawing (1) Freehand	1	Drawing (1) Freehand	1
Drawing (8) Geometric	2	Drawing (8) Projections	2	Drawing (2) Lettering	2
Mathematics (14) Plane Trigonometry	5	Mathematics (15), (16) Trigonometry, Algebra	2, 3	Mathematics (17) Plane Analytics	5
Rhetoric (1) Paragraph Writing	2	Rhetoric (1) Theme Writing	2	Rhetoric (1) Prose Analysis	2
Shop Work (1) Carpentry and Pattern Making	3	Shop Work (1) Carpentry and Pattern Making	3	Shop Work (1) Carpentry and Pattern Making	3
Cadet Service		Cadet Service		Cadet Service	

Electives, three to five hours — any work upon which the student is qualified to enter, in any College except the College of Law.

SECOND YEAR

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Drawing (3) Projections	3	Drawing (3) Descriptive Geometry	3	Drawing (3) Shades, Shadows and Per	3
Physics (2) Mechanics and Heat	3	Physics (2) Electricity	3	Physics (2) Sound and Light	3
Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2
Shop Work (2) Forging	3	Shop Work (2) Forging	3	Shop Work (3) Foundry	3
Cadet Service		Cadet Service		Cadet Service	

Electives, six to eight hours—any work upon which the student is qualified to enter, in any College except the College of Law.

THIRD YEAR

Drawing (5) Technical	3	Industrial Arts (2) Tech. Drawing	3	Industrial Arts (2) Tech. Drawing	3
Industrial Arts (1) Tools and Machines	3	Industrial Arts (1) Tools and Machines	4	Industrial Arts (1) Tools and Machines	3
Shop Work (4) Chipping and Filing	3	Shop Work (5) Machine Work	3	Shop Work (5) Machine Work	3

Electives, eight to ten hours—any work upon which the student is qualified to enter, in any College except the College of Law.

FOURTH YEAR

Industrial Arts (3) Shop Equipment	3	Industrial Arts (3) Shop Appliances	3	Industrial Arts (3) Shop Management	3
Industrial Arts (4) Tech. Drawing	3	Industrial Arts (4) Tech. Drawing	3	Industrial Arts (4) Tech. Drawing	3
Shop Work (6) Machine Work	3	Shop Work (6) Machine Work	3	Shop Work (6) Machine Work	3

Electives, eight to ten hours—any work upon which the student is qualified to enter, in any College except the College of Law. At some time during the Course, the student must elect in Chemistry the equivalent of at least five hours for two terms.

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis embodying the results of a special study. The subject of such study must lie within the field of Industrial Arts. The subject must be announced to the President of the University (dependent upon the written approval of the head of the Department) not later than the beginning of the second term of the Senior Year, and the completed thesis must be submitted not later than the second Saturday before Commencement Day.

COURSE IN CHEMISTRY

The object of this Course is to prepare students for work in Industrial Chemistry or Metallurgical Chemistry, according to electives chosen. With proper electives it will also be found a desirable course for students expecting to become general analytical chemists.

The electives are subject to the approval of the head of the department of Chemistry, or of Metallurgy and Mineralogy for students in Metallurgical Chemistry.

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Mathematics (14) Trigonometry	5	Mathematics (15) (16) Trigonometry, Algebra	5	Mathematics (17) Plane Analytics	5
Chemistry (7) Inorganic	5	Chemistry (7) Inorganic	5	Chemistry (12) Inorganic	5
Rhetoric (1) Paragraph Writing	2	Rhetoric (1) Theme Writing	2	Rhetoric (1) Prose Analysis	2
German (1) or (4)	4	German (1) or (4)	4	German (1) or (4)	4
Drawing (1) Freehand	2	Drawing (1) Freehand	2	Drawing (2) Lettering	3
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Chemistry (4) Quantitative	5	Chemistry (4) Quantitative	5	Chemistry (4) Quantitative	5
Physics (2) Mechanics and Heat	3	Physics (2) Electricity and Magnetism	3	Physics (2) Sound and Light	3
German (2) Scientific Reading	2	German (2) Scientific Reading	2	German (2) Scientific Reading	2
Shopwork (1) Woodwork	3	Shopwork (1) Woodwork	3	Metallurgy (2) Mineralogy	3
Cadet Service		Cadet Service		Cadet Service	

Electives three to five hours throughout the year.

The following are suggested : Mathematics (18, 19, 20), 5 hours; Drawin (3), 3 hours; Physiology (3), 3 hours; History (5), 4 hours; Economics (1), 4 hours.

THIRD YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Metallurgy (5) Laboratory	5	Metallurgy (5) Laboratory	5	Metallurgy (5) Laboratory	5
Chemistry (8) Organic	5	Chemistry (9) Organic	5	Chemistry (9) Organic	5
Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2	Rhetoric (3) Advanced	2

Electives five to eight hours throughout the year.

The following are suggested: Physical Laboratory, 3 to 5 hours; Geology, 5 hours—or Geology and Determinative Mineralogy, 5 hours; Shopwork, 3 hours.

FOURTH YEAR

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Metallurgy (4) Fuels and Iron	5	Chemistry (16) Applied	3	Ceramics (16) Applied	3
Chemistry (17) Inorganic Preparations	4	Chemistry (14) Theoretical	3	Chemistry (15) Sanitary	4
		Physiology (8) Bacteriology	2		

Electives to make the total work equal sixteen or eighteen hours, including Thesis work.

Students in Metallurgical Chemistry will take Ore Dressing the first term, and Metallurgy (4)15, through the second term. For such students Chemistry (14, 15, 16) and Physiology (8) will not be compulsory.

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of the study must lie within the field of Chemistry or Metallurgy. The subject must be announced to the President of the University (dependent upon the approval of the head of the department), not later than the beginning of the second term of the Senior Year, and the completed thesis must be submitted not later than the second Saturday before Commencement Day.

COURSE IN ARCHITECTURE

This Course was established in 1896, to meet a growing demand for special training along this line. The extremely rapid developments, in late years, of novel methods of construction, the constantly extending list of materials used, and the creation of types of building entirely without precedent in the history of architecture, render it not only desirable, but imperative, that a large class of thoroughly trained and equipped men shall be brought forward, if this progress is to be maintained.

The employment in architecture of so many young men trained in other branches of engineering seems to prove the urgent need of those whose training is directed expressly to this end.

The Course offered gives a good training in mathematics, physics and mechanics, which are fundamental, together with a thorough drill in drawing, designing, shop work, and the more technical branches of architecture proper.

NOTE — The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows the statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (1) Freehand	3	Drawing (1) Freehand	3	Drawing (1) Water Color	3
Gen. Chemistry (7) Inorganic	5	Gen. Chemistry (7) Inorganic	5	Drawing (2) Lettering	3
Mathematics (14) Plane Trigonometry	5	Mathematics (15), (16) Trigonometry, Algebra	2, 3	Mathematics (17) Plane Analytics	5
Rhetoric (1) Paragraph Writing	2	Rhetoric (1) Theme writing	2	Rhetoric (1) Prose Analysis	2
Shop Work (1) Carpentry and Pattern Making	3	Shop Work (1) Carpentry and Pattern Making	3	Shop Work (1) Carpentry and Pattern Making	3
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (7) Photography	2	Architecture (1) Orders	5	Architecture (2) Styles	5
Drawing (3) Projections	3	Drawing (3) Descriptive Geometry	5	Drawing (3) Shades, Shadows and Per	5
Drawing (14) Pen	2	Drawing (12) Clay Modelling	2	Drawing (12) Clay Modelling	2
Greek (1) Ancient Art	2	Greek (1) Ancient Art	2	Greek (1) Ancient Art	2
Physics (2) Mechanics and Heat	3	Physics (2) Electricity and Magnetism	3	Physics (2) Light and Sound	3
Mechanical Eng. (23) Materials of Construction	5				
Cadet Service		Cadet Service		Cadet Service	

THIRD YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Architecture (3) Designing	5	Architecture (3) Designing	5	Architecture (3) Designing	5
Architecture (4) Specifications	2	Architecture (5) Decorations	3	Architecture (6) Estimates	4
Civil Engineering (15) Masonry	5	Architecture (7) Heating	5	Architecture (8) Designing	5
Civil Engineering (20) Roof Trusses	5	Civil Engineering (6) Stereotomy	4	Civil Engineering (21) Surveying	3

SHORT COURSE IN MINING

The Short Course in Mining is especially designed for young men who have had a practical experience in mines, and wish to study Mine Surveying, Drafting, the problems of Ventilation, Drainage, Haulage, Mine Operating, etc., and also something of the sciences bearing upon their work, but have neither the time nor the preparation for a full college course. The first year is devoted to a thorough study of the elementary mathematics and sciences necessary to prepare the student for the practical work of the second year. The experience of the past eight years has shown beyond any doubt that any enterprising young miner can master the subject sufficiently well in the time assigned to materially increase his earning capacity and chances for promotion in his occupation.

Personal instruction is given, and it is made thoroughly practical and of such a character as to best adapt it to the needs of the individual student.

NOTE—The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Mathematics (2) Algebra	5	Mathematics (2) Algebra	5	Mathematics (2) Algebra	5
Mathematics (3) Geometry	5	Mathematics (13) Geometry	5	Mathematics (14) Trigonometry	5
Physics (1) Elementary	5	Physics (1) Elementary	5	Geology (1) Phys. Geography	5
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Drawing (1) Freehand	2	Drawing (4) Draughting	3	Drawing (2) Lettering	2
Drawing (3) Projections	3	Geology (4) Elementary	5	Metallurgy (9) Mineral Chemistry	5
General Chemistry (7) Inorganic	5	General Chemistry (13) Laboratory	3	Mine Engineering (3) Mine Operating	5
Mine Engineering (1) Mine Surveying	5	Mine Engineering (2) Ventilation and Haulage	5	Shop Work (2) Forging	3
Cadet Service		Cadet Service		Cadet Service	

SHORT COURSE IN CLAY-WORKING AND CERAMICS

The two-year or Industrial Course is designed to assist young men who have already been actively engaged in the Ceramic industries, and who, on account of mature years, or lack of means, or lack of previous educational advantages, are unable to avail themselves of the full and complete course, and yet who wish to increase their earning power or chances of promotion by fitting themselves for other than routine labor. The requirements for admission to this course are very low, and the work required throughout is much less severe than that of the four-year course; in fact, anyone who is willing to really apply himself, can retain his membership in this class, but there is no place for any but those who are thoroughly in earnest, and poor work will not be accepted from those who are able to do good work.

In short, in this Industrial Course, the department recognizes its closest medium of communication with the wants of the clay industries, and it is intended to so maintain this course as always to render the greatest good to the greatest number.

NOTE—The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Gen. Chemistry (7) Inorganic	5	Gen. Chemistry (7) Inorganic	5	Gen. Chemistry (12) Analytical	5
Physics (1) Elementary	5	Physics (1) Elementary	5	Geology (1) Phys. Geography	5
Mathematics (1) Algebra	5	Mathematics (3*a*) Geometry	5	Shop Work (2) Forging	3
				Shop Work (4) Chipping and Filing	2
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Ceramics (1) Analysis of Limestone	4 etc.	Ceramics (2) Analysis of Clays	4	Ceramics (3) Analysis of Glazes	4
Ceramics (4) Gen. Principles	5	Ceramics (5) Brick	5	Ceramics (6) Pottery	5
Geology (2) General	5	Drawing (11) Mechanical	5	Geology (3) Economic	5
Cadet Service		Cadet Service		Cadet Service	

SHORT COURSE IN INDUSTRIAL ARTS

This course is primarily designed to extend the benefits of the same kind of training as that given in the four-year course in this subject to that class of young men who may be unable for any reason to undertake a course of four years' duration, but who aspire to become actively engaged in factory work. It has been the aim to give, in as condensed a form as possible; those studies which will most rapidly and easily be turned to practical account in manufacturing operations; such as drawing, shop work, use of machine tools, etc., together with a grounding in the physics and mathematics which underlie these operations.

The course will be found most valuable to young men already engaged in factory work, who find themselves limited from rising in their work on account of lack of technical education.

NOTE—The figure in parenthesis following the name of each study indicates the number of that study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (1) Freehand	1	Drawing (1) Freehand	1	Drawing (1) Freehand	1
Drawing (8) Geometric	2	Drawing (8) Projections	2	Drawing (2) Lettering	2
Mathematics (2) Algebra	5	Mathematics (2) Algebra	5	Mathematics (2) Algebra	5
Mathematics (3) Plane Geometry	5	Mathematics (13) Space Geometry	5.	Mathematics (14) Trigonometry	5
Shop Work (1) Carpentry and Pattern Making	3	Shop Work (1) Carpentry and Pattern making	3	Shop Work (2) Forging	3
Cadet Service		Cadet Service		Cadet Service	

SECOND YEAR

Drawing (3) Projections	3	Drawing (3) Descriptive Geometry	3	Drawing (3) Shades, Shadows and Per	3
Industrial Arts (1) Tools and Machines	3	Industrial Arts (1) Tools and Machines	3	Industrial Arts (1) Tools and Machines	3
Physics (1) Elementary	5	Physics (1) Elementary	5	Geology (1) Phys. Geography	5
Shop Work (3), (4) Foundry and Chipping and Filing	5	Shop Work (5) Machine Work	5	Shop Work (6) Machine Work	5
Cadet Service		Cadet Service		Cadet Service	

DEPARTMENTS OFFERING INSTRUCTION IN THE COURSES OF THE COLLEGE OF ENGINEERING—DESCRIPTION OF EQUIPMENT AND CLASSES.

ASTRONOMY.

Professor H. C. Lord.

The importance of a practical knowledge of the methods of astronomical observation to Civil Engineers made the establishment of the Emerson McMillin Observatory a very important advantage to the College of Engineering. The instructions given to the Engineering students includes the use of this fine equipment in practical work under the immediate supervision of the Director.

The building and its equipment is the gift of Mr. Emerson McMillin, of Columbus, Ohio, and was built during the summer of 1895. The first floor is divided by a hall and stairway into two parts. The east wing contains an office, library, clock room and a large, well lighted room for the students, furnished with tables, where they reduce their observations and keep the records of their work. The west wing contains the transit house, the dome and photographic dark room. The transit house is a light frame structure, so designed as to be kept as free as possible from heat radiated by any heavy wall of masonry. The dome is a wooden framework covered on the outside with canvas. The rest of the building is of pressed brick, the foundations and second story being "rock-faced."

The equipment consists of a twelve-inch equatorial telescope, mounting by Messrs. Warner & Swasey, objective by Mr. Brashear, with a large and powerful spectroscope by Mr. Brashear. This instrument is adapted to use either one or two prisms or a grating, and is provided with a double set of objectives, one corrected for the visual and one for the photographic rays; a positive micrometer with a seven-inch circle by Messrs. Warner & Swasey; a combined zenith telescope and transit instrument of three inches clear aperture by Mr. G. N. Saegmuller; a sideral clock by Clemens Riefler, of Munich; a comparater by Carl Ziliss; a four-inch portable equatorial by Alvan Clark; a chronograph by Warner & Swasey; sextants, chronometers, meteorological instruments, etc. In addition to the above, Mr. McMillin's gift provides for an excellent astronomical library.

2. **Astronomy and Geodosy.** Lectures on practical Astronomy, supplemented by practice with the instruments of the Emerson McMillin Observatory. Text-book, Doolittle. Four times a week. (Third Term of third year and First Term of fourth year of Course in Civil Engineering.)

CHEMISTRY.

Professor McPherson, Professor Norton, Assistant Professor Foulk, Mr. Fischer.

The laboratories of the Department accommodate three hundred and eighty-five students. The general lecture room is large and well lighted, and all needed facilities are provided for the full experimental illustration of the lecture courses. The Department is supplied with the best apparatus and materials for both lecture and laboratory work, and has also a growing collection of specimens illustrating the application of chemistry to the arts.

Chemical Hall is occupied by the Departments of Chemistry, Mining, Metallurgy, and Pharmacy. The buildings and contents have cost about sixty-two thousand dollars. It is two stories in height, with a basement. It is built of pressed brick laid in red mortar. At the entrance is a large loggia, and beyond this is a vestibule opening into the main hall.

The Department of Chemistry occupies the middle and western portion of the second floor and the middle portion of the first floor. The main lecture room has a seating capacity of one hundred and fifty persons. The laboratory of elementary chemistry accommodates three hundred students. The qualitative laboratory contains desks for twenty students. The quantitative laboratory, on the first floor, is the same size as the laboratory of elementary chemistry, and has accommodations for fifty students. Besides these, there is a laboratory for organic chemistry, with desks for fifteen students, a room for combustions, a room for the preparation of experiments, a balance room, a room for working with foul gases, one for spectroscopic work, one for rough work, one for books, three private laboratories and an office.

7. **Elementary Chemistry.** Inorganic. Lecture, Laboratory and Quiz. Laboratory work; First Term, experiments upon the non-metals; Second Term, principles of qualitative analysis. Five times a week. (Required in First and Second Terms of first year in all four-year Engineering Courses, except Industrial Arts, and in Short Course in Clay-working, and in First Term, first year, of Short Course in Mining.)

12. **Qualitative Analysis.** Five times a week. (Required in Third Term, first year, Course in Chemistry, and Short Course in Clay-working.)

13. **Qualitative Analysis.** Three laboratory periods a week. (Required in Second Term, second year, Short Course in Mining Engineering.)

4. **Quantitative Analysis.** Laboratory, lectures and recitations. Use of the balance and general principles of gravimetric analysis. Drill

in the solution of problems in quantitative analysis; study of properties of precipitates; principles of volumetric analysis. Selections are made from such analytical methods as best meet the needs of the students. The samples used for analysis are mixtures or commercial products, the percentage composition of which is not made known to the student until he has reported his own results. Five times a week. (Required throughout second year Course in Chemistry.)

8. **Organic Chemistry.** Lectures. Five times a week. (Required in First Term, third year Course in Chemistry.

9. **Organic Chemistry.** Laboratory. Five times a week. (Required in Second and Third Terms of third year Course in Chemistry.)

14. **Theoretical Chemistry.** Lectures and recitations. Three times a week. (Required in Second Term of fourth year Course in Chemistry.)

15. **Sanitary Analysis.** Laboratory and lectures. A study of the most important chemical methods for the analysis of water and air. Four times a week. (Required in Third Term of fourth year of Course in Chemistry.)

16. **Applied Chemistry.** Lectures on Industrial Chemistry. These are made as practical as possible by visits to different chemical works. When possible specialists deliver lectures on subjects belonging to their particular line of work. Three times a week. (Required in Second and Third Terms of fourth year of Course in Chemistry.)

17. **Inorganic Preparations.** Four times a week. (Required in First Term of fourth year of Course in Chemistry.)

For Courses in the technical analysis of iron, steel and allied products, see the Department of Mining and Metallurgy.

CIVIL ENGINEERING.

Professor Brown, Assistant Professor Sherman.

The facilities provided for the illustration of the Courses in Civil Engineering and Practical Training are as follows: One high grade and three ordinary transits, three leveling instruments, solar compass, prismatic compass, improved telescope compass, Abney hand level, level and stadia rods, sight poles, chains, tapes; twenty-six improved drawing tables with 30″ by 36″ top; Schroeder's models in stereotomy and roof trusses; large set of models of wooden joints; collection of photographs of bridges both when finished and in course of erection; collections of strain sheets and shop drawings of bridges, new improved cement testing machine and outfit for making all kinds of cement tests; stone mason's tools for working models out of plaster blocks; magic lantern and slides; calculating machines; sets of drawing instruments; blue-print room with outfit; set of tracings of standard structures from which each student makes a set of blue-prints. The equipment is growing each year by the addition of materials purchased, presented, or made by students of the Department.

1. **Land Surveying.** Recitations and field work. Johnson's Theory and Practice of Surveying. Six times a week. (First Term ot second year of Course in Civil Engineering.)

2. **Railroad Surveying.** Recitations and field work. Searle's Field Engineering. Six times a week. (Third Term of second year of Course in Civil Engineering.)

3. **Topographical Surveying.** Lectures, field work and drawing. Johnson's Surveying used for reference. Four times a week. (First Term of third year of Course in Civil Engineering.)

4. **Topography.** Platting, pen and tinted work. Reed's Topographical Drawing and Sketching. Four times a week. (Second Term of second year of Course in Civil Engineering.)

5. **Working Drawings in Railway Construction.** Lectures and drawing and estimates of simple structures. Three times a week. (Second Term of third year of Course in Civil Engineering.)

6. **Stereotomy.** Recitations, drawing and model cutting. Warner's Stereotomy. Four times a week. (Second Term of third year of Course in Civil Engineering and Architecture.)

7. **Bridge Strains.** Recitations and lectures. Part I of Dubois's Strains in Framed Structures. Five times a week. (Third Term of third year of Course in Civil Engineering.)

8. **Bridge Designing.** Lectures and drawing. Part II of Dubois's Strains in Framed Structures and Johnson's Modern Framed Structures used for reference. Five times a week. (First Term of fourth year of Course in Civil Engineering.)

10. **Sanitary Engineering.** Lectures. Five times a week. (Third Term of fourth year of Course in Civil Engineering.)

14. **Civil Engineering Laboratory.** Cement testing, adjustment of instruments. Twice a week. (Second Term of fourth year of Course in Civil Engineering.)

15. **Masonry Construction.** Recitations and lectures. Baker's Masonry Construction. Five times a week. (First Term of fourth year of Course in Civil Engineering, and First Term of third year of Course in Architecture.)

16. **Highways.** Lectures on roads, streets, canals, railroads and rivers. Five times a week. (Second Term of fourth year of Course in Civil Engineering.)

    Fourth year students in Civil Engineering must elect either 16 or 17.

17. **Railway Location.** Recitations and lectures. Wellington's Economic Theory of Railway Location. Fives times a week. (Second Term of fourth year of Course in Civil Engineering.)

    Fourth year students in Civil Engineering must elect either 16 or 17.

18. **Water Supply.** Recitations and lectures. Fanning's Water Supply. Five times a week. (Second Term of fourth year of Course in Civil Engineering.)

19. **Trusses.** Lectures and drawing. Five times a week. (Third Term of third year of Courses in Mining Engineering and Mechanical Engineering.)

20. **Roof Trusses.** Lectures and drawing. Five times a week. (First Term of third year of Course in Architecture.)

21. **Surveying.** Recitations and field work. Davies' Surveying. Three times a week. (Third Term of third year of Course in Architecture.)

CLAY-WORKING AND CERAMICS.

Professor Edward Orton, Jr., Mr. Hughes.

This Department was created to fill a gap in the educational facilities of the country which has long been felt by the clay-working industries. It was the first, and is now, the only school on American soil which has made a direct step toward placing the ceramic industries on the same plane as that occupied by the other branches of engineering science and chemical technology. At present the clay-working industries of America, while they enjoy a prosperity due partly to our unrivalled deposits of crude materials, and partly to the mechanical skill and business energy with which they are prosecuted, are feeling constantly the effects of foreign competition, and find themselves at some disadvantage in this contest on account of the wasteful and uneconomic methods used here, and also the very limited extent to which scientific training and chemical technology are employed in counteracting this waste.

Clay industries are essentially chemical industries and their problems are such as can be readily solved and controlled by the use of good chemical engineering. It is to create such a class of ceramic engineers, men who can apply to the clay industries of today the full fruits of the best knowledge of modern science, that this Department has been organized and maintained; and it is confidently hoped that the clay industries will co-operate with it in its efforts to achieve present progress, and lead them to ultimate international supremacy.

The facilities of the Department comprise: 1st. A convenient chemical laboratory, specially designed and equipped for the analysis and decomposition of silicates. Provision has been made for the use of hydrofluoric acid with safety, and the platinum ware has been made to order with this purpose in view. 2d. A complete mechanical outfit for the preparation of clays for pottery manufacture and the production of the ware itself, of any grade from earthen wares to porcelain. The machinery is of the latest types and comprises all important varieties in use for grinding, tempering, washing, filtering and molding. 3d. A similar plant for the manufacture of brick, tiles, pipes and hollow goods. The machinery here is of full size and samples up to a ton in weight can be received and transformed into the finished articles by any or all of the standard methods in commercial use. The power for this purpose is derived from a fine electric motor, driven from the University power plant. 4th. A kiln house, equipped with a kiln in which several hundred bricks, or an equivalent quantity of sewer-pipe, stoneware, or pottery can be burnt. The fuel is intended to be coke, except in special cases where the fuel available for burning clay wares is to be made the subject of test. There is also provided a crucible melting furnace and a muffle furnace for testing glazes. A muffle kiln of large size for burning pottery, glazed ware and decorated wares has recently been put into operation. 5th. A ceramic museum, containing a fine collection of American pottery and clay products of every class, is in process of installation. 6th. A library of the best literature on the subject, mainly German, but containing a few English and French works, and the trade periodicals.

1. **Quantitative Analysis of Simple Minerals.** This course is open only to those who have completed General Chemistry 12. The student begins the quantitative analysis of salts and chemicals, and later works on limestone and other easy minerals. Four times a week. (First Term of second year of Course in Ceramics and five times a week first term of second year Short Course in Clay-working.)

2. Continuation of Course 1. The student begins the quantitative analysis of clays and complex minerals, working first on samples of known composition, and later on unknown materials. Four times a week. (Second Term of second year of Course in Ceramics, and five times a week Second Term of second year of Short Course in Clay-working.)

3. Continuation of Course 2. The student completes the ultimate analysis of clays and begins the proximate or "Rational" analysis of clays and pottery bodies, following the methods of Seger. Four times a week. (Third Term of second year of Course in Ceramics, and five times a week of Third Term of second year of Short Course in Clay-working.)

4. **A Series of Lectures** (supplemented by frequent recitations) on the origin, composition and properties of clays and other minerals employed in the clay, glass and cement industries. Five times a week. (First Term of third year of Course in Ceramics, and First Term of second year of Short Course in Clay-working.) Laboratory work in the physical testing of clays, and in their mechanical analysis.

5. Continuation of Course 4. A series of lectures, with recitations, on the general principles of the manufacture of bricks and the coarser clay wares, including the selection and winning of the materials, their preparation, manufacture, burning and testing. Five times a week. (Second Term of third year of Course in Ceramics and Second Term of second year of Short Course in Clay-working.)

6 Continuation of Course 5. A series of lectures, with recitations, on the classification and manufacture of pottery and the finer grades of clay wares, including the selection of the materials, preparation of the bodies, manufacture of the ware, preparation of the glazes, burning and decoration of the wares and the pyrometry of ceramics. Five times a week. (Third Term of third year of Course in Ceramics and Third Term of second year of Short Course in Clay-working.)

7. Continuation of Course 3. Open only to those who have completed that course. The analysis of glasses and glazes, devoting special attention to the use of hydrofluoric acid in silicate analysis, and to the determination of lead and boracic acid. Five times a week. (Second Term of third year of Course in Ceramics.)

8. Continuation of Course 7. The further analysis of colored glasses and glazes, enamels, and ceramic colors, especial attention being given to the determination of the coloring and opacifying oxides. Five times a week. (Third Term of third year of Course in Ceramics.)

9. **Laboratory Work in Ceramics.** Open only to those who have completed Courses 3 and 6. The student will first undertake the production of such wares as are made from single clays, such as bricks for building and paving purposes; then those wares whose bodies are made by blending two or more natural clays, such as firebrick and refractory materials, earthenwares, stonewares and

yellow wares; and, lastly, such wares as are made by the building up of an artificial body, such as is used in the production of white wares, porcelain and in glazed and encaustic tiles. In each case the bodies made will be made into appropriate wares, burnt and tested as to quality. Five times a week. (First Term of fourth year of Course in Ceramics.)

10. Continuation of Course 9. The student will practice on the production of glasses and glazes, beginning with the natural "slip glazes" and taking successively the soft raw-lead glazes, the fritted lead-boracic-acid glazes, and the hard-fire leadless porcelain glazes. In each case the glazes will be made for use on some definite body, and will be made to "fit" it accurately. Five times a week. (Second Term of fourth year of Course in Ceramics.)

11. Continuation of Course 10. The student will practice on the use of the coloring and opacifying oxides in glazes, and on the production of vitrifiable colors for the underglaze and overglaze decoration of pottery, and in the production of body-stains for encaustic wares. Five times a week. (Third Term of fourth year of Course in Ceramics.)

12. **A Series of Lectures** on the manufacturing and testing of natural and Portland cements and hydraulic silicates. Open to students who have had courses 3 and 6. Facilities for laboratory work in making, burning and testing cements will be given. Five times a week. (Second Term of fourth year of Course in Ceramics.)

13. **Practice** in making drawings and specifications for brick kilns, brick dryers, pottery kilns, gas producers, glass pot-furnaces, glass tanks, cement kilns and burning cylinders. Students will be allowed to specialize along the lines they intend to follow. Twice a week. (Second Term of fourth year of Course in Ceramics.)

14. **Mineral Reports.** A series of lectures and recitations, with frequent quizzes, on the prospecting and opening up of mineral properties and in the inspection of factories and ceramic plants, with a view to recommending economic changes in them. Frequent trips will be made to the important clay-working centers of Ohio for field work and practice in observation. Students will be allowed to specialize along their intended lines. Five times a week. (Third Term of fourth year of Course in Ceramics.)

15. **Thesis.** A satisfactory thesis, involving original investigation and special study must be completed as a requisite for graduation. The subjects for these must lie inside the range of ceramic work, but can be made to follow the lines along which the student has been specializing. (Third Term of fourth year of Course in Ceramics.)

16. **General Principles of Applied Ceramics.** A series of lectures on the chemical technology of the clay, glass and cement industries. Three times a week. (Third Term of fourth year of Course in Chemistry.)

DRAWING.

Associate Professor Bradford, Assistant Professor French, Mr. Lewis.

This Department occupies the entire third floor of Hayes Hall and is equipped for the illustration of the work in drawing and for practical training in the same. For freehand drawing; flat and shaded copies in pencil and charcoal; wooden models of geometric forms; plaster casts of ornaments, flowers, fruit and the antique; easels and drawing tables for pen and ink drawing and for water-color and oil painting; a well selected line of work from artists of recognized ability. For mechanical drawing: O. S. U. improved drawing tables (30″ x 36″ tops), a set of the celebrated Schroeder models, a collection of shop drawings and facilities for blue-printing. For photography: a well-arranged and equipped dark room, printing outfits, copying camera, four view cameras, lenses of long and short focus, flash lamp and a shutter for instantaneous photography. In addition to the above, the library contains a well-chosen collection of books pertaining to the work of the Department.

1. **Freehand Drawing.** Practice and occasional lectures. Pencil, charcoal, pen and water-color drawing from copies, models and plaster casts.

One drawing period a week, three terms first year of both Courses in Industrial Arts.

Two drawing periods a week, first term of second year of Short Mining Course.

Two drawing periods a week, first and second terms of first year of all four-year Engineering Courses.

Three drawing periods a week, three terms of first year of Course in Architecture.

2. **Lettering.** Practice and occasional lectures.

Two drawing periods a week, third term of first year of both Courses in Industrial Arts and second year of Short Mining Course.

Three drawing periods a week, third term of first year of all four-year Courses, except Industrial Arts and in the three-year Course in Architecture.

This course must be preceded by Course 1.

3. **Mechanical Drawing.** Lectures or recitations, one period a week. Practice two periods a week. Subjects: Orthographic, Isometric and Oblique Projection and elementary Working Drawings. First term of second year of all four-year Courses, except Chemistry, and in three-year Course in Architecture and two-year Course in Mining and Industrial Arts.

   Lectures or recitations two periods a week. Practice one period a week in both Courses in Industrial Arts and in all four-year Courses except Civil Engineering and Chemistry; three periods a week in Civil Engineering and Architecture. Subject: Descriptive Geometry. (Second term of second year.)

   Lectures or recitations, one period a week. Practice, two periods a week in both Courses in Industrial Arts and in all four-year Courses, except Chemistry; four periods a week in Course in Architecture. Subject: Shades, Shadows and Perspective. (Third Term, second year.)

   This course must be preceded by Course 2.

4. **Draughting and Blue-printing.** Practice and occasional lectures. Three periods a week, second term of second year in the Short Mining Course. This Course must be preceded by the first term of Course (3).

5. **Technical Drawing.** Lectures and practice. Rules and methods for working drawings, tracing, blue-printing, machine design and practice in making same to represent form and dimensions for shop use. Three periods a week. First term of third year of Mechanical and Electrical Engineering and Industrial Arts Courses. This Course must be preceded by Courses (2) and (3).

7. **Photography.** Lectures and practice. Lectures: Optics of Photography, chemistry of photography, exposing and developing, printing, lantern slides, orthrochromatic photography and some of the applications of photography. Practice in outdoor, interior, instantaneous and flashlight photography, copying, lantern slides and printing. Two periods a week. Required in First Term of second year of Course in Architecture; Third Term of third year of Courses in Civil and Mechanical Engineering; First Term of fourth year of Course in Ceramics; Third Term of fourth year of Course in Mining Engineering.

8. **Mechanical Drawing.** Lectures and practice. Geometric and Projection Drawing. Two periods a week. (First and Second Terms of first year of both Courses in Industrial Arts.)

11. **Mechanical Drawing.** Lectures and practice. Five periods a week. (Second Term of second year of Short Course in Clay-working.)

12. **Clay Modeling.** Modeling in clay and casting in plaster, ornamental forms from designs, photographs, nature and original designs. Two periods a week. (Second and Third Terms of second year of Course in Architecture.)

    This Course must be preceded by Course (1).

14. **Pen Drawing.** Two periods a week. (First Term of second year of the Course in Architecture.)

    This Course must be preceded by Course (1).

ARCHITECTURE.

1. **Orders of Architecture.** Detail Drawing of the Orders, to accompany the study of Ancient Art. One lecture and four practice periods a week. (Second Term of second year of Course in Architecture.)
2. **Styles of Architecture.** Lectures and drawing of Architectural Details representing the characteristic styles in Architecture. One lecture and four practice periods a week. (Third Term of second year of Course in Architecture.)
3. **Designing.** Lectures and Designing of Architectural structures adapted to modern requirements. Five periods a week. (First, Second and Third Terms of third year of Course in Architecture.)
4. **Specifications.** Lectures and practice in preparing Specifications for Architectural Structures. Two periods a week. (First Term of third year of Course in Architecture.)
5. **Decoration and Ornament.** Lectures. The practice part of this Course will be incorporated in Courses (3) and (8). Three periods a week. (Second Term of third year of Course in Architecture.)
6. **Estimates.** Lectures and practice in preparing estimates for structures designed in Courses (3) and (8). The duties of a superintendent will be considered in this Course. Four periods a week. (Third Term of third year of Course in Architecture.)
7. **Heating and Ventilating.** Lectures. The practical applications of this Course will be incorporated in Courses (3) and (8). Five periods a week. (Second Term of third year of Course in Architecture.)
8. **Designing.** Lecture and Practice. Designing of buildings requiring steel and fire-proof construction. Five periods a week. (Third Term of third year of Course in Architecture.)

ELECTRICAL ENGINEERING.

Associate Professor Caldwell, Mr. Fish.

This Department has excellent facilities for practical experimental work with dynamo machinery and other electrical apparatus. The elementary electrical testing is provided for in the Physcial Department, which permits this Department to devote its energies to the study of engineering apparatus proper. The dynamo equipment consists of twenty-five machines of various makes and sizes from 40 H. P. down; aggregating over 200 horse power. These include direct and alternating current generators, polyphase motors, arc and incandescent lighting generators, railway and stationary motors and a unipolar dynamo. The latter, with an alternating current generator and a 2-phase motor, were built by the students; it being the policy of the Department to build as much of its apparatus as possible. There are also a number of transformers of different makes, including one for welding,—built at the University. Arc lamps of different styles, a 10-kilowatt-hour storage battery, condensers and resistances, and magnetic testing apparatus also form part of the equipment. The list of measuring instruments is quite complete, and includes a standard Weston voltmeter and eleven other Weston volt and am-meters, also four Kelvin static voltmeters, five dynamo-meters, one watt-meter, three galvanometers and a dozen other am-meters and voltmeters of different makes. A telephone laboratory—with apparatus for comparative tests, a variety of transmitters and receivers, and lines running to another building, has been in use for two years. Photometry is given at present in the Physical Laboratory, where the equipment in this line is excellent. Power for running the dynamo laboratory is supplied by three induction motors from the University Power Plant. This latter is a model 2-phase plant and the electrical part of it has been for the most part installed by the students of the Department. The repair and maintenance of this plant is done by the students, who receive compensation for the time so spent.

Columbus and nighboring towns have many electrical plants of different systems which welcome visiting students. It is also usual to make an inspection trip to one or more of the cities of the state to visit manufacturing establishments and other points of electrical interest.

It is the aim of the Course to give a thorough working knowledge, made practical by constant applications in the laboratory and designing rooms, of the laws underlying Electrical Engineering, and incidentally to familiarize the student with the machinery and apparatus.

While there is at present no regular graduate course in Electrical Engineering, there is a very good opportunity for a limited amount of graduate and special advanced work. Also graduates of general courses in other institutions are given special facilities for taking the Engineering Degree here.

The Electrical Hall was built in 1889 by a special appropriation of the Legislature, and is occupied entirely by the Department of Electrical Engineering. It is a two-story brick building about seventy-five by forty-five feet. In the first floor, sixty feet are taken up by the dynamo room, which is well lighted and has an asphalt floor, laid on concrete. The remainder of the floor is occupied with an office and apparatus room, a shop and a calibrating room arranged for the accurate and easy standardization of the instruments used in the laboratory. On the second floor are a lecture and draughting room 45 by 30 feet, a reading room and library, office, photometric laboratory, stock room, locker room and janitor's room. The building and its equipment are valued at about fifteen thousand dollars.

UNIVERSITY POWER PLANT.

The buildings of the power plant were completed in 1896 and, with their contents, form a model plant. The boiler room is 38 by 100 feet, and is equipped with five 150 H. P. boilers, with Babcock and Wilcox chain grates and Murphy automatic stoker. There are also coal and ash conveyors for the whole plant. At one end of the boiler room is the coal room, and at the other the pit for the hot well, from which also runs the tunnel (of which there is about three-fourths mile) to the buildings of the University, carrying heat, gas and water-pipes, and power, light and other wires. Near the boiler house is the power house, 40x60 feet. The power generating plant consists of a 70 Horse Power McEwen compound engine, belted to a 60 kilowatt 2-phase Westinghouse Alternator, and a 200 Horse Power Watertown Compound, direct connected to a 125 kilowatt 2-phase generator. These occupy the main floor, together with a complete marble switchboard, with ammeters, voltmeters, wattmeters, static ground detectors, etc. A ten-ton traveling crane is available for handling the machinery in this room. In the basement are condensers, which get their water from a cooling reservoir at the side of the building. Here also are the transformers that convert the current to be used in the motors scattered over the campus, from 1100 volts, at which it is generated, to 440 volts, at which it is transmitted.

There are installed on the campus over eighteen hundred incandescent lamps. twenty-four arc lamps and about 250 H. P. in motors. The electric plant is for the most part of the Westinghouse system. The buildings are of brick. Nearly all of the University buildings are heated by steam from this plant. The total cost of the plant for generation of power, light and heat, and for its transmission to the buildings, has been something over $100,000.

2. **Electrical Engineering.** Lectures, Recitations and Problems. Theory of dynamo-electric machinery, including direct current and alternating current generators and motors; methods of regulation and control; circuits, lamps and auxiliary apparatus; storage bat-

teries; applications of electricity to street car and mine-working; design, construction and management of plant. Five times a week. (First, Second and Third Terms of fourth year of Course in Electrical Engineering.)

3. **Electrical Designing.** Including D. C. and A. C. generators and motors, transformers, distribution, etc. Three times a week. (First, Second and Third Terms of fourth year of Course in Electrical Engineering.)

4. **Electrical Laboratory.** A full experimental course in the handling and testing of generators, motors, storage batteries, circuits, etc. Three half days a week. (First, Second and Third terms of fourth year of Course in Electrical Engineering.)

6. **Electrical Engineering.** Lectures on direct and alternating circuits, dynamo machinery, transformers, accumulators and applications. Twice a week. (First and Second Terms of fourth year of Civil, Mining and Mechanical Engineering Courses.)

7. **Electrical Engineering.** Laboratory work on the subjects treated in Course 6, which it accompanies. Twice a week. (First and Second Terms of fourth year in Civil, Mining and Mechanical Engineering Courses.)

FRENCH LANGUAGE.

Professor Bowen, Mr. Brush.

1. **Elementary French.** Grammar and reader, modern prose and plays. Four times a week. (First, Second and Third Terms of first year in Civil, Mining, Mechanical and Electrical Engineering Courses.) Offered as alternative with German 1.

2. **Modern French Literature.** Four times a week throughout the year. Open to those who have completed Course 1.

3. **Science Reading.** Open to those who have completed Course 1 (or an an equivalent). Twice a week. (First, Second and Third Terms of second year in Civil, Electrical, Mechanical, Mining and Ceramics Courses.) Offered as voluntary.

GEOLOGY.

Professor Orton, Assistant Professor Bownocker.

The University is able to present unusual advantages for the study of Geology. By an act of the Legislature it has been put in possession of all the collections made by the late geological survey, and these collections have been supplemented by valuable additions of fossils and minerals from various sources. The State collection embraces a very complete representation of every geological formation shown in Ohio. In its new and ample quarters the Department offers exceptionally good opportunities for work in the lithological, petrographical and modeling laboratories.

Orton Hall, completed at a cost of more than $100,000, is designed for the permanent accommodation of the large geological collection of the University and for work and instruction in the Department of Geology. A portion of it is occupied by the library and reading room. The building is two stories in height, with a high basement, is built of brick and faced with sandstone, and is fire-proof throughout. Some of the material was contributed by various quarries of the State of Ohio, and almost all of the finer varieties of Ohio building stone are represented in the columns, walls and ceiling panels of the vestibule. At the right of the main entrance is the geological lecture room and professor's private room; at the left is the University library, reading room and librarian's private room. The central and rear portion is occupied by the geological and paleontological museums. The petrographical laboratory is located on the ground floor. In the basement a room is used for work in geographical modeling, the finished models being afterwards placed in the collection of such models in a room set apart for the purpose on the second floor. The basement accommodates also the museum of economic geology. A paleontological laboratory or working room is also provided on the second floor.

1. **Physical Geography.** Lectures and Recitatins. Geikie's Elementary Lessons, supplemented by lectures, map drawing, and the study of geographical models. Five times a week. (Third Term of first year of Short Courses in Mining and Ceramics, and Third Term of second year of Short Course in Industrial Arts.)

2. **General Geology.** Cosmical Geology, Lithological Geology, Dynamical and Structural Geology. Books of reference used by students in preparation of their work: Green's Physical Geology, Geikie's Text Book of Geology, LeConte's Elements of Geology, Hunt's Chemical Geology, Daubree's Geologic Experimentale. Five times a week. (First Term, third year, Civil Engineering Course, and First Term, fourth year, Mining and Ceramic Courses.)

   Paleontological Geology, Historical Geology. Books of reference used by students in preparation of their work: Nicholson's Paleontology, Zittel's Paleontologie, Ohio Geological Reports, Paleontology of New York. Five times a week. (Second Term, third year, Civil Engineering Course, and Second Term, fourth year, Mining Course.)

3. **Economic Geology.** Lectures. Economic materials of stratified rocks, clays, limes, cements, coals, iron, ores, phosphates, petroleum, etc. Economic materials derived from veins and igneous rocks, gold, silver, copper, mercury. Gems. Books of reference used by

students in preparation of their work: Publication of U. S. Geological Survey, State Geological Surveys, Phillips' Ore Mining. Five times a week. (Third Term, fourth year, Courses in Civil, Mining Engineering and Ceramics.)

4. **Elementary Geology.** Lectures and Recitations. Text-book: Le-Conte's Class Book of Geology. Five times a week. (Second Term of second year in Short Course in Mining.)

GERMAN LANGUAGE.

Professor Eggers, Assistant Professor Mesloh.

1. **Elementary.** Four times a week. (First, Second and Third Terms of first year of Ceramic and Chemical Courses. Offered in First, Second and Third Terms of first year of Courses in Civil, Electrical, Mechanical and Mining Engineering, as alternative with French 1.)

2. **Science Reading.** Twice a week. (First, Second and Third Terms of second year of Course in Chemistry. Voluntary in other Engineering Courses.)

4. **German Literature.** Four times a week. (First, Second and Third Terms of first year of Course in Chemistry. Required of students entering with credits for German 1.)

GREEK LANGUAGE AND LITERATURE.

Professor Smith, Assistant Professor Hodgman.

1. **Lectures on History of Ancient Art.** Twice a week. (First, Second and Third Terms of second year of Course in Architecture.)

INDUSTRIAL ARTS AND SHOPWORK.

INDUSTRIAL ARTS.

**Professor Williston, Mr. Knight, Mr. Weick, Mr. Sleffel.*

The shops, which occupy the north wing of Hayes Hall, afford excellent facilities for instruction in both the practical details and the underlying principles of carpentry, pattern-making, forging, moulding, foundry work and machine work.

The carpenter and pattern shop is equipped with twenty-five benches with complete sets of carpenter tools for each and a large number of special tools for general use, twenty-three pattern-makers' turning lathes, with cupboards containing the necessary turning and pattern-making tools under each, a pony planer, a buzz planer, a circular rip and cross-cut saw, a scroll saw, a trimmer and a power grindstone.

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* Resigned.

The forge shop is equipped with twenty stationary forges, with anvils and tools for each, a heating forge, a portable hand forge, a foot-power hammer, a blacksmith's drill and a punch, shear and bar cutter. The blast for the forges is furnished through under-ground piping by a 45″ Buffalo pressure blower, and the smoke is removed by a 55″ Buffalo exhaust fan overhead. Both of these fans are driven by a 15 horse-power electric motor.

The foundry is equipped with a 24″ Calliau cupola, the blast for which is furnished by a 30″ Buffalo blower; two brass furnaces, one 16 inches in diameter and the other 20 inches in diameter; a core oven, benches for iron and brass moulding, core-making and cleaning of castings, a space for floor moulding 30 feet by 40 feet, besides all the necessary moulding tools, flasks, crucibles, ladles, tongs, etc.

The machine shop is driven by a 30 horse-power electric motor from above, and is equipped with the following tools: Twenty-eight benches for vise work, with complete sets of tools; eight speed lathes, sixteen engine lathes, two planers, two shapers, a milling machine, an upright drill, a sensitive drill, grinding machines for both plane and cylindrical surfaces, tool grinders, emery wheels, etc. This machinery is furnished with all the necessary tools, and the tool-room is equipped with full sets of drills, taps, dies, milling cutters, standard plugs, guages, threads, micrometers and a great variety of special tools.

Hayes Hall is a large building of pressed brick and brown sandstone completed and equipped at a cost of about $70,000. It is devoted to instruction in Industrial Arts, Drawing, Civil Engineering, Mechanical Engineering and Domestic Science. The central portion is three stores high and the front wings are two stories each. On the first floor are two offices, the rooms of the Department of Domestic Science and two lecture rooms; besides the machine shop, the forge shop and the foundry. On the second floor are the carpenter and pattern shops, and the Department of Civil Engineering, with private rooms annexed.

The Department of Drawing occupies the third floor for instruction in mechanical and free-hand drawing and photography.

1. **Tools and Machines.** Lectures and recitations on hand and machine tools and the principles underlying their construction and operation, and materials used in construction. Three times a week. (First, Second and Third Terms of third year of Course in Industrial Arts, and second year of Short Course in Industrial Arts.)

2. **Designing.** Problems in design, to accompany Course 1. Three times a week. (Second and Third Terms of third year of Course in Industrial Arts.)

3. **Shop Equipment, Appliances and Management.** A continuation of Course 2. Three drawing periods a week. (First, Second and Third Terms of fourth year of Industrial Arts Course.)

4. **Advanced Designing.** A continuation of Course 2. Three drawing periods a week. (First, Second and Third Terms of fourth year of Course in Industrial Arts.)

5. **Workshop Appliances.** Lectures and problems in shop methods and means of turning out work economically for the market. Twice a week. (Third Term of fourth year of Course in Mechanical Engineering.)

6. **Machine Design.** Practical application of the principles of machine design. Five times (ten hours' practice) a week. (Third Term of third year of Courses in Electrical and Mechanical Engineering.)

SHOP WORK.

1. **Carpentry and Pattern Making.** Exercises and practice in carpentry, wood-turning and pattern-making, including sawing, planing, mortising, splicing, framing and other work involving the use of the ordinary carpenter tools; center and chuck turning, and the making of patterns and core boxes. (Required in all Engineering Courses, except Civil Engineering. For time requirements see Courses.)

2. **Forging.** Exercises and practice in iron and steel forging, including such operations as drawing, bending, forming, upsetting, welding and the making and tempering of punches, drills, chisels, lathe tools, springs. (Required in all Engineering Courses, except Civil Engineering, and Chemistry. For time requirements see Courses.)

3. **Foundry Work.** Exercises and practice in tempering sand and preparing moulds of machine parts in the sand, core-making, melting iron and brass and pouring castings. Three hours a week. (First Term of second year of Course in Mechanical Engineering, and Third Term of second year of Course in Industrial Arts.)

4. **Chipping and Filing.** Exercises and practice in vise work, including surface chipping in cast and wrought iron, surface filing, squaring, fitting, finishing, and the scraping of surface plates. (Required in all Engineering Courses, except Civil, and Chemistry and Short Mining. For time requirements see Courses.)

5. **Machine Work.** Exercises and practice in hand-turning in iron and brass on speed lathes; in straight and taper turning, boring, fitting, chucking, thread-cutting on engine lathes. Three hours a week.

(Third Term of second year of Course in Mechanical Engineering, and Second and Third Terms of third year of Course in Industrial Arts, and Second Term of second year of Short Course in Industrial Arts.

6. **Advanced Machine Work.** Exercising and practice on planer, shaper, drill, milling and grinding machines, the construction of working parts of actual machines, and making, tempering and grinding standard plugs, counter bores, milling cutters, drills, taps, reamers. Three hours a week. (First and Second Terms of third year of Mechanical Engineering Course, and First, Second and Third Terms of fourth year of Course in Industrial Arts, and Third Term of second year of Short Course in Industrial Arts.)

MATHEMATICS.

Professor Bohannan, Assistant Professor McCoard, Mr. Arnold, Mr. Swartzel, Lieutenant Martin, Mr. Kuhn.

1. **Elementary Algebra.** Venable. Fives times a week. (First Term, first year, Short Course in Ceramics.)

2. **Elementary Algebra.** Wentworth. Five times a week. (First, Second and Third Terms, first year, Short Courses in Mining and Industrial Arts.)

3. **Plane Geometry.** Venable. Five times a week. (First Term, first year, Short Courses in Mining and Industrial Arts.)

3a. **Plane Geometry.** Venable. Five times a week. (Second Term, first year, Short Course in Ceramics.)

13. **Solid Geometry.** Venable. Five times a week. (Second Term, first year, Short Courses in Mining and Industrial Arts.)

14. **Plane Trigonometry.** Loney. Fives times a week. (First Term, first year, all except two-year Courses; Third Term, first year, Short Courses in Mining and Industrial Arts.)

15. **Analytical and Spherical Trigonometry.** Loney, with notes on Spherical Trigonometry. Twice a week. (Second Term, first year, all except two-year Courses.)

16. **College Algebra.** Taylor. Three times a week. (Second Term, first year, all except two year Courses.)

17. **Plane Analytics.** Loney. Five times a week. (Third Term, first year, all except two year Courses.)

18. **Analytics and Differential Calculus.** Loney. Venable. Edwards. Five times a week. (First Term, second year, Civil, Mechanical, Mining, Electrical and Ceramics Courses.)

19. **Differential Calculus.** Edwards. Five times a week. (Second Term, second year, same as 18.)

20. **Integral Calculus.** Edwards. Five times a week. (Third Term, second year, same as 18.)

11. **Differential Equations.** Edwards. Once a week. (First Term, third year, Mechanical and Electrical Engineering Courses.)

8. **Least Squares.** Merriman. Twice a week. (First Term, third year, Course in Civil Engineering.)

MECHANICAL ENGINEERING.

Professor Magruder, Associate Professor Hitchcock.

The lectures and recitations of this Department are held in the west wing of Hayes Hall, and in the second floor room of the Mechanical Hall. Mechanical Hall is a brick building 93 feet front by 32 feet deep, with a wing 32 by 80 feet. The second floor contains a lecture room, and is fitted with drawing tables. The main floor has three large rooms. The Museum is fitted with glass cases for the care of delicate apparatus, measuring machines and other instruments of precision, samples of engineering supplies and specimens of materials which have been tested and broken either in the laboratory or in practice; and also a collection of models of mechanisms and valve gears.

The south laboratory is used for applied mechanics and for gas engineering. Here are located the machines for testing the strength and elasticity of engineering materials, and recording their physical properties automatically and autographically. Oils are tested as illuminants and as lubricants. Belts and pulleys are tested for their slippage, friction and horse-power transmitted. The gas engine plant has three engines, representing gas and gasoline, three methods of ignition, and fly ball and inertia governors. The air is supplied by a fan through a large meter. Temperatures and pressures of air, gas and water are measured. The fresh and burnt gases are analyzed and their heating values determined by a calorimeter. The power is measured at both the indicator and the brake. The laboratory machine shop and tool room are in this room.

The north laboratory is used as a steam engineering and hydraulic laboratory. Four 35-horse-power engines give facilities for testing single or duplex condensing or non-condensing, simple or compound, throttling or automatic cut-off engines, using either a jet or a surface condenser. Pressure and vacuum gauges are calibrated. Indicator springs of five makers are tested either cold or hot. Five kinds of calorimeters determine the moisture in steam before and after passing three different separators. Injectors are tested for lift, quantity, pressure and steam consumption. Steam pumps of six makes, ranging to 800 gallons per minute capacity; two centrifugal and a rotary pump, enable tests of pumps to be made and deliver water at pressures below 150 pounds to two stand-pipes, which in turn supply turbine and cascade, and Pelton, water wheels, and enable experiments to be made on the flow of water through orifices, pipes, valves, etc. Three cisterns, provided with a variety of weirs up to five feet wide, give practice in measuring flowing water. A Venturi meter and a Pitot tube are also used. Ericsson and Rider hot air engines are tested. A Rife hydraulic engine, a Humphryes ram, Gem and Eureka water motors, and a pulsometer, are included in the hydraulic apparatus, all of which are connected and prepared for complete tests.

A complete set of Westinghouse air-brake apparatus, a blower and a ventilating fan, enable experiments to be performed in the flow of air. They are supplemented by tests of the heating and ventilating plants in the buildings of the campus.

In addition to the apparatus and equipment of the power plant of the University (see under Electrical Engineering), the power house at Townshend Hall contains a horizontal, return tubular boiler, two steam engines and an ammonia refrigerating machine, making the facilities on the campus for testing quite complete. Machinery, apparatus and appliances are continually being presented, built or purchased, and the student is given an opportunity to test everything under practical conditions of operation. Besides the laboratory facilities, opportunities frequently arise to test machinery, engines or boilers in the city, and in these tests the students take part.

3. **Mechanism.** Lectures and recitations on the principles of mechanism and mechanical movements. Five times a week. (Second Term of third year of Mechanical and Electrical Engineering Courses.)
   The accurate laying out of movements, embodying the principles of mechanism. Twice a week. (Third Term of third year of Course in mechanical Engineering.)

6. **Analytical Mechanics.** Five times a week. (First and Second Terms of third year of Civil, Mining, Mechanical, Electrical and Ceramics Courses.)

7. **Strength of Materials.** Recitations and lectures on the elastic and ultimate resistance of the materials of engineering to stress and their use in structures and machines. Lectures on elementary hydraulics and the flow of water through orifices and pipes over weirs, and in streams, and on measuring the same. Five times a week. (Third Term of third year of same as Course 6.)

8. **Thermodynamics.** Lectures and recitations on the transformation of heat and mechanical energies. Ideal indicator diagrams of steam, air and gas engines; the flow of gases through pipes and orifices. Five times a week. (First Term of fourth year of Courses in Electrical and Mechanical Engineering.)

9. **Prime Movers.** Lectures and recitations on steam and gas engines, turbine water wheels, valve movements and governors; their construction, operation, efficiency and economy. Five times a week. (Second Term of fourth year of Courses in Electrical and Mechanical Engineering.)

10. **Steam Boilers.** Lectures and recitations on steam boilers, furnaces, automatic stokers, gas producers and boiler appliances; their construction, operation, efficiency and economy. Five times a week. (Third Term of fourth year of Courses in Electrical and Mechanical Engineering.)

12. **Experimental Engineering Laboratory.** Twice a week. (First Term of third year of Course in Mechanical Engineering.)

13. The same. Four times a week. (First Term of fourth year of Course in Mechanical Engineering.)

14. The same. Four times a week. (Second Term of fourth year of Course in Mechanical Engineering.)

15. The same. Three times a week. (Third Term of fourth year of Course in Mechanical Engineering.)

16. The same. Four times a week. (Third Term of third year of Course in Electrical Engineering.)

17. The same. Three times a week. (Second Term of fourth year of Course in Civil Engineering.)

Courses 12, 13, 14, 15, 16, 17, 24 and 25, in the Experimental Engineering Laboratory, are arranged to meet the needs of the different students in obtaining experimental practice in the use and calibration of accurate measuring instruments; in testing illuminating and lubricating oils for friction, endurance, and the like; in the calibration and adjustment of gauges and springs; in testing the strength and elasticity of the materials of construction in tension, compression, torsion, flexure, shear and impact, in the flow of liquids and gases; in the use of the steam engine indicator and transmission and absorption dynamometers; in testing of steam separators, injectors, steam pipe coverings; belt, rope and chain gearing; in setting valves and eccentrics; in making efficiency tests of simple and compound, condensing and non-condensing steam engines; of steam boilers and complete power plants; of gas and hot air furnaces; of pulsometer steam and centrifugal pumps; of hydraulic rams and of impulse and turbine water wheels.

18. **Machine Design.** Recitations on Unwin's Machine Design, with lectures on American Practice. Five times a week. (First and Second Terms of fourth year of Courses in Mechanical Engineering.)

20. **Hydraulic Machinery.** Recitations and lectures on pumping machinery. Twice a week. (Third Term of fourth year of Course in Mechanical Engineering.)

21. **Thesis Work.** Five times a week. (Third Term of fourth year of Course in Mechanical Engineering.)

22. **Timber and Masonry.** Lectures on the construction of foundations and structures in timber and masonry. Five times a week. (The last three-fifths of Second Term of third year of Course in Mechanical Engineering.)

23. **Materials of Construction.** Lectures on the materials used in architecture and building construction, and laboratory exercises on their properties. Five times a week. (First Term of second year of Course in Architecture.)

24. **Experimental Engineering Laboratory.** Three times a week. (First and Second Terms. Elective to third year and fourth year engineers.)

25. **Experimental Engineering Laboratory.** Three times a week. (Third Term of fourth year of Course in Civil Engineering.)

METALLURGY AND MINERALOGY.

Professor N. W. Lord, Mr. Haas.

The Department of Metallurgy and Mineralogy occupies the eastern part of Chemical Hall. In the basement are the smelting furnaces, the assay laboratory, a room for rough work, and store rooms for supplies. On the first floor is the lecture room of the professor in charge, a laboratory with desks for sixteen students, a store room, a balance room, a private laboratory and an office.

The metallurgical laboratory has all the appliances for the most modern methods of technical analysis as practiced in iron and steel laboratories, including gas analysis. A furnace room in the basement is fitted for gold and silver assaying, with improved muffle and crucible furnaces.

The lecture room in metallurgy has arrangements for projecting photographs of machines, mines, and furnaces, for class illustration, and there is a large collection of such views. There is a photographic room with blue-printing facilities, where students learn to make copies of the drawings used in illustrating the lectures.

A collection of minerals and rocks with a large set of rock sections is provided for illustrating the mineralogy, as well as sets of blow-pipe apparatus for the students in determinative mineralogy.

2. **Mineralogy.** Lectures arranged so as to be preparatory to Determinative Mineralogy (Course 3). Three times a week. (Third Term of first year in Courses in Civil and Mining Engineering and Ceramics, and second year of Course in Chemistry.)

3. **Determinative Mineralogy.** Laboratory Course in practical determination of minerals by physical and chemical tests. Each student is furnished with a set of apparatus, and works under an instructor's inspection. Brush's Determinative Mineralogy is used as a manual. Five times a week. (Third Term of third year of Course in Mining Engineering.)

4. **Metallurgy.** A course of lectures upon fuel and its uses, iron and steel, copper, lead, gold and silver, their properties, tests, ores and details of the modes of reduction. The lectures are supplemented by a careful study of references to standard works and journals. Five times a week. (First and Second Terms of third year of Course in Mining and Mechanical Engineering, and First Term of fourth year of Course in Ceramics and Chemistry.)

5. **Metallurgical Laboratory.** Lectures and laboratory work. Laboratory practice in the analysis of iron and steel, fuels and slags, and the assay of lead, copper and zinc ores by wet methods, using

approved methods as practiced in technical laboratories of metallurgical works. Course 5 must be preceded by General Chemistry, Courses 7 and 12. Five laboratory periods a week. (First, Second and Third Terms, second year of Course in Mining Engineering, third year of Course in Chemistry.)

6. **Assaying.** Laboratory work. Practical work in the assaying of gold, silver and lead ores, by furnace methods. Oral instruction, with references to standard books on assaying. Five laboratory periods a week. (Second Term of third year of Course in Mining Engineering.)

7. **Metallurgical Construction.** Practice in the designing of furnaces and other metallurgical machinery, including detail drawings and estimates. Three times a week. (Second Term of fourth year of Course in Mining Engineering.)

8. **Ore Dressing and Coal Washing.** Lectures. Instruction in the methods of concentrating and enriching ores and fuels by mechanical means. Lectures with reference to Rittinger's Aufbereitung; Callon's Course d'Exploration des Mines; Kunhardt's Ore Dressing, and various papers in technical journals. Twice a week. (First Term of fourth year of Course in Mining Engineering.)

9. **Mineral Chemistry.** Lectures upon fire-damp, mine explosions, explosives, boiler waters, poisonous gases, iron ores; iron and steel, their properties and modes of manufacture; coal and coke. Five hours a week. (Third Term of second year of Short Course in Mining.)

MILITARY SCIENCE AND TACTICS.

Lieutenant Martin.

1. **Military Drill.** Three times a week through the year.
2. **Tactics.** Lectures and recitations. Twice a week. (Second Term.)
3. **Art of War.** Lectures and recitations. Twice a week. (Second Term.)

MINE ENGINEERING.

Associate Professor Ray.

This Department is equipped with all of the latest improved instruments and apparatus used in mine engineering, surveying and the study of mine ventilation. There is a collection of models of mine machinery and supplies, to which additions are being made which are valuable as illustrations. The draughting room is large, well lighted and provided with a desk for each student, where he is personally taught map making and the platting of actual surface and underground surveys; the making of tracings of drawings and how to make blue-prints. He is also taught proper methods of keeping notes and all records necessary to an efficient engineer's office. The students are given practical experience by making actual surveys of coal mines and in working up their notes complete in all of the necessary details. The students are also taught how to make working drawings, plans, estimates and specifications of mining operations and equipment.

The lecture room has arrangements for projecting photographs of machines, mines and mine equipment, for class illustration, and there is a collection of such views. Also a photographic room with blue-printing facilities, where students learn to make copies of the drawings made by themselves and those used in illustrating the lectures.

The Mining Engineering Course pays special attention to underground surveying, mapping, timbering, ventilation and other matters relating to safety and speed system and method in extracting coal and other materials.

1. **Mine Surveying.** Lectures and field practice. This is similar to Course 4, but more elementary. The same text is used. The students have more practice in the drawing room. Five times a week. (First Term of second year of Short Course in Mining.)

2. **Ventilation and Haulage.** Lectures illustrated by experiments and maps of mines and models when possible, tests by safety lamps and anemometers, and methods of air distribution in coal mines, Five times a week. (Second Term of second year of Short Course in Mining.)

3. **Mine Operating.** A course of lectures and practical instruction in mine book-keeping and accounts, cost of working, etc., particularly adapted to Ohio coal mining. Five times a week. (Third Term of second year of Short Course in Mining.)

4. **Mine Surveying.** Field practice in the use of instruments for surface and underground surveys. Full notes are taken and maps and plans made in the drawing room. Davies's Surveying, by Van Amringe, is used as a text-book. Five times a week. (First Term of third year of Courses in Mining Engineering and Ceramics.)

5. **Mine Engineering.** Lectures. Mine operating, mining machinery, ventilation, shaft-sinking, working out deposits, etc. Constant reference is required to the standard works and to the leading technical journals, with practice in designing mine plants, draughting and estimates. Five times a week. (First, Second and Third Terms of fourth year of Course in Mining Engineering.)

6. **Plans and Specifications.** Five times a week. (Third Term of fourth year of Course in Mining Engineering.)

PHYSICS.

Professor Thomas, Assistant Professor Boyd, Mr. Kester.

The Department has an excellent equipment of apparatus, to which additions are constantly being made. The apparatus includes a large collection of pieces for illustration of the general lecture room work, but is principally chosen for accurate measurement in the laboratory. A set of standards of length, capacity and mass, sent under the act of Congress supplying such sets to the several agricultural colleges, is in the possession of the Department. The pieces are copies of the United States standards made by the Coast Survey at Washington.

Among the principal pieces of apparatus are a dividing machine by Fauth & Co.; chronometers by Parkinson & Frodsham and by Negus, the latter a break-circuit; a chronograph by Fauth & Co.; a Hipp's chronoscope; cathetometers by Salleron and by the Geneva Society, the latter an exceptionally fine instrument; Regnault's apparatus for vapor tension, for expansion of gases and for specific heat; Melloni-Tyndall apparatus for radiant heat; standard thermometers by Baudin and others; Rutherford and Rowland, diffraction gratings; Rowland's spectrum photographs, spectroscopes by Brashear, Browning, Apps and others; Salleron's complete apparatus for projections in polarized light; lanterns for projections by the lime light and the arc light; a variety of sound apparatus from Koenig; portable and quadrant electrometers; Kelvin galvanometers of high and low resistance; Weidmann, Kohlrausch and other galvanometers; standard resistance coils, with Cavendish laboratory certificate; several sets of resistance coils and bridges; a Kew magnotometer; Kelvin standard balances; Weston ammeters and voltmeters; standards of self-induction; standard battery cells; photometric standards and photometers; X-ray apparatus, etc.

Under the laws of Ohio, the professor of physics is ex-officio State Sealer of Weights and Measures, and all of the standard weights, measures and balances received from the United States government are in the rooms of the Department.

1. **Elementary Physics.** Recitations and experimental lectures. Five times a week. First and Second Terms. Text: Carhart & Chutes' "Elements of Physics." (Required in first year of Short Courses in Mining and Ceramics, and in second year of Short Course in Industrial Arts.)

2. **Mechanics and Heat. Electricity and Magnetism, Sound and Light.** Lectures and recitations. Three times a week. (First, Second and Third Terms in all except the two-year Courses.)

3. **Physics.** Extension of Course 2, with practice in solution of problems. Twice a week. (First, Second and Third Terms of second year of Course in Electrical Engineering.)

4. **Electricity and Magnetism.** Lectures and recitations. Three times a week. (First Term, third year Course in Electrical Engineering.)

5. **Physical Laboratory.** Elementary manipulation. Length, mass and time measurements. Work in density, elasticity and in heat. Three times a week. (Second and Third Terms of second year of Course in Electrical Engineering.)

6. **Physical Laboratory.** Theory and practice of magnetic and electrical measurement, including the testing and standardizing of instruments; conductivity of conductors; insulations, capacity and resistance of insulated conductors and cables; temperature co-efficients; commercial measuring and testing instruments; strength and distribution of magnetic fields, magnetic moments, permeability; work in light, including optical constants; spectroscopy; photometry of gas, electric and other lights. Five times a week. (First, Second and Third Terms, third year Course in Electrical Engineering.)

7. **Physical Laboratory.** Course 7 must be preceded by Course 2. Twice a week (Second Term), three times a week (Third Term, second year of Course in Mechanical Engineering.)

9. **Physical Laboratory.** A second year's work in Physical Laboratory. Three times a week, with five hours' credit. Course 9 must be preceded by Course 7. Elective.

The work in the Physical Laboratory begins with exercises in length, mass and time measurements, making use of scales, tapes and bars, micrometer screws, micrometer microscopes, the dividing engine, the cathetometer, the balance, chronometers, chronoscopes, etc. This course is intended to give the student facility in the use of instruments, and knowledge of the theory of their construction and adjustment.

The determination of various physical constants follows, with elementary exercises in heat, light, electricity and magnetism; after which the student takes up such advanced work as his taste and skill permit. The experimental work is accompanied by instruction in methods and in the discussion of results.

RHETORIC AND ENGLISH LANGUAGE.

Professor Denney, Assistant Professor Taylor, Assistant Professor Graves.

1. **Paragraph Writing and Practical Rhetoric.** Themes and exercises. Twice a week. (First, Second and Third Terms of first year in all except two-year Courses.)

3. **Advanced Rhetoric.** Twice a week. (First, Second and Third Terms of second year in Electrical and Mechanical Engineering and Industrial Arts, and third year of Courses in Civil, Mining, Ceramics and Chemistry.)
4. **Advanced Composition.** Twice a week. (First, Second and Third Terms of second year. Voluntary in Civil, Mining, Mechanical and Electrical, and Ceramics Courses.)

NOTE—In addition to the above, all of which are required in the Engineering Courses, there are many subjects which may be elected in some of the Courses of this College. For descriptions of these consult the General University Catalogue.

ADMISSION, ATTENDANCE AND GRADUATION.

The entrance examinations for 1898 will be held on Monday, Tuesday and Wednesday, September 12, 13 and 14.

Applicants for admission to the College of Engineering must be at least seventeen years of age, and must be provided with credentials of scholarship from their last instructors, or from the last institution with which they have been connected, and with certificate of good moral character.

There are three modes of admission to the University:

1. Certificates of the preparatory departments of Colleges of approved standing and of Normal schools in Ohio are accepted, if found satisfactory, in lieu of examination for preparatory studies, under the following conditions:

Each certificate must contain a detailed statement of the studies pursued, the text-books used, the amount of work done in each study, the amount of time devoted to it, the date of the examination, and the applicant's rank or standing in it. A copy of the course of study should accompany the certificate; and both should be sent to the University not later than the first of September. The University cannot promise this recognition to certificates presented during entrance week.

Blank certificates will be furnished on application.

Applicants for admission who come from other Colleges or Universities are required to bring certificates of honorable dismission.

Teachers' certificates (in force) will be accepted at their face value.

2. From time to time the University approves the courses of study in certain High Schools of the State: and the graduates of these High Schools are admitted on presentation of cards issued to them at their graduation through their principals.

3. All other applicants are subject to examination on the groups of study mentioned below.

Full equivalents for the text-books named will be accepted.

ADMISSION TO SPECIAL STUDIES.

Students who desire to pursue special lines of work in the University, and do not desire to become candidates for degrees, will be admitted on the following conditions:

1. The regular entrance requirements must be satisfied.

But applicants who are not less than eighteen years of age, after obtaining credit for elementary or "grade" work, and for such other subjects as may be necessary to qualify them for the classes that they wish to enter, may, on the presentation of satisfactory reasons, be admitted by the Faculty to any class in the College; provided, that if any student who has been admitted on these conditions afterwards becomes a candidate for a degree, he shall take the omitted entrance examinations at least twelve months before the degree is conferred.

2. On entering the College, students desiring to pursue special work are required to lay before the Faculty, for approval or modification, a written statement of the end they have in view, the studies proposed for the attainment of that end, and the probable period of attendance. Such students will be held as strictly to their accepted schemes of work as are the regular undergraduates to their courses of study.

3. *Permission to enter as special undergraduates will be refused to all who fail to give satisfactory evidence of definiteness of purpose, and will be withdrawn whenever the conditions on which it was granted cease to exist.*

ADMISSION TO ADVANCED STANDING.

1. Applicants who do not come from some other University or College must first obtain admission in the manner already described. They will then be examined on the undergraduate studies for which they ask credits.

2. Applicants who come from the collegiate department of an approved College, and who bring explicit and official certificates describing their course of study and scholarship, and also certificates of honorable dismission, will be admitted without examination, except such as may be necessary to determine what credit they are to receive here for work done in the College from which they come.

REQUIREMENTS FOR ADMISSION TO THE FOUR-YEAR COURSES, AND TO THE COURSE IN ARCHITECTURE.

The following are the requirements:

1. *Arithmetic, Descriptive and Physical Geography, English Grammar and United States History.*

2. *English*—(*a*)—Composition and Rhetoric. Each applicant will be tested as to his ability to write clear and correct English. The test will be the writing of two essays of about two hundred words each. The first essay will be upon a subject drawn from the candidate's observation or experience; as "A description of my native town," "The most remarkable person I ever met," "My reasons for seeking a University education." The second essay will be upon a subject drawn from a list of classics which will be furnished on application.

The proper preparation for this requirement is sustained and regularly practice in writing. The pupil should be afforded weekly practice in preparing written exercises—paragraphs, outlines, themes, reproductions and abstracts; and his written work should be corrected by the teacher and revised and rewritten by himself.

The pupil should be familiarized with those principles of Rhetoric which are most likely to help him in his composition work; such as the principles of sentential structure, outlining, paragraphing, and choice of words. The study of specimens of bad English is not recommended; the time usually devoted to this may be better spent in memorizing and reciting notable passages of prose and poetry selected from works read entire by the class. Exercises in speaking from a topical outline previously prepared by the class are recommended for drill in expression and choice of words.

The subjects for the weekly written exercises should be so distributed that the pupil will have practice in the four types—description, narration, exposition and argumentation. Some of these subjects should be taken from the classics prescribed below and from other classics, preferably by the same authors, prescribed for parallel or subsidiary outside reading by the class, but fully one-half of the subjects upon which the pupil writes during his preparatory course should be drawn from his own observation and experience, especially subjects in description and narration.

(b) English Classics—Questions will be set for the purpose of testing the applicant's knowledge of the subject matter, form and substance, of the following books; with the plot, purpose, literary style and peculiarities, incidents, and characters of which the applicant should make himself thoroughly familiar:

1898. Milton's Paradise Lost, Books I and II; Pope's Iliad, Books I and XXII; Goldsmith's The Vicar of Wakefield, Southey's Life of Nelson, Lowell's The Vision of Sir Launfal, Hawthorne's The House of the Seven Gables.

1899. Chaucer's The Knight's Tale, or Dryden's Palamon and Arcite; Milton's Paradise Lost, Books I and II; Pope's Iliad, Books I, VI, XXII, and XXIV; The Sir Roger de Coverly Papers in The Spectator, Goldsmith's The Vicar of Wakefield, Scott's Ivanhoe, Cooper's The Last of the Mohicans, Lowell's The Vision of Sir Launfal, Hawthorne's The House of Seven Gables.

1900. Chaucer's The Knight's Tale, or Dryden's Palamon and Arcite; Milton's Paradise Lost, Books I and II; Pope's Iliad, Books I, IV, XXII, and XXIV; The Sir Roger de Coverly Papers in The Spectator, Goldsmith's The Vicar of Wakefield, Scott's Ivanhoe, Cooper's The Last of the Mohicans, Macauley's Essay on Milton, Burke's Conciliation with the Colonies.

These or equivalent texts will require minute and critical study in class during at least one school year. The test here is the pupil's ability to analyze plot and character, to explain words, phrases and figures, to reproduce thought, to point out characteristics of style. Systematic classroom study of the texts themselves is the only adequate preparation. Literary history, literary biography and the comments of professional critics will not serve the purpose. The work in class should be intensive and disciplinary; there the distinction between the reading of literature and the study of classics should be sharply defined. Outside reading of other works, preferably by the same authors, is recommended, and should be prescribed as the basis of part of the composition work; but this general reading and composition work should not be regarded as an adequate substitute for the minute study of the few classics prescribed above, and will not be accepted as preparation for this part of the English requirement.

3. *Algebra*—Wentworth's, White's, or Well's Elements, complete.
4. *Civil Government*—Fiske or Thorpe preferred.
5. *Geometry, Plane and Solid*—Venable, Wentworth, White, or Wells.
6. *History*—Myer's General History.
7. *Latin* — Pronunciation (the Roman method); Grammar (an exact knowledge of the inflections is essential); Cæsar, the first four books of the De Bello Gallico.

Or *French* – The whole subject of French Grammar. Applicants will be expected to read at sight easy French and to translate correctly into French, simple English sentences. Two years ought to be given to this study, the first year being spent mainly on the Grammar and the second devoted to reading good modern French. The texts read should be chiefly narrative and conversational prose; modern, rather than classic, dramas should be read.

Or *German* — Joynes-Meissner's German Grammar, complete; Joyne's German Reader, complete; Hauff's Liechtenstein, Lessing's Minna von Barnhelm, Huss's Sessenheim and Buchheim's Goethe's Dichtung und Wahrheit.

For the year 1898-99 the German or French required for admission may be begun at the University, but without University credits.

8. *Physics*— Gage, Carhart and Chute, Avery or Appleton, complete.

NOTE.—An applicant for admission who may be somewhat in arrears in any given subject, will find opportunity to make up this work in the Columbus High Schools, which are fully accredited by the University.

No student will be admitted to the College of Engineering who is in arrears more than fifteen hours, of which not more than five hours may be in Mathematics.

REQUIREMENTS FOR ADMISSION TO THE SHORT COURSES IN MINING, IN CLAY-WORKING AND CERAMICS, AND IN INDUSTRIAL ARTS.

Applicants must be not less than sixteen years of age, and unless they are over twenty-one years of age must pass an examination in Arithmetic, Geography, Grammar and Orthography, or bring High School or other certificates for these branches.

Applicants who are over twenty-one years of age are admitted without examination.

REGISTRATION.

All students are required to register and pay their term fees on or before the first day of each term, between the hours of 8:00 a. m. and 12 m., or between 1:00 and 4:00 p. m., central standard time.

Former students who fail to register as above will be charged one dollar in addition to the usual incidental fee, for the first day of delinquency, and fifty cents additional for each subsequent day.

No candidate for graduation will be permitted to register for the second term of his graduating year, except upon presentation to the Bursar of the President's certificate that his thesis subject has been announced and approved.

AMOUNT OF WORK.

No student is permitted to take less than fifteen hours a week of class-room work, except by special permission, and no student will be permitted to take more than the regular work of the class to which he belongs, who has not passed all his work for the preceding term.

ELECTIVE STUDIES.

All elections of work in continuous studies, when once made, are understood to be made for the entire collegiate year.

The right is reserved to withdraw the offer of any elective study when it is not chosen by at least four persons.

EXAMINATION AND STANDINGS.

At the close of any term a student failing to pass in two-thirds of his work will be considered on probation; and a second similar failure will forfeit his connection with the University.

DEGREES.

The degree of Civil Engineer is conferred on those who have completed the Course in Civil Engineering; that of Engineer of Mines on those who have completed the Course in Mining Engineering; that of Mechanical Engineer on those who have completed the Course in Mechanical Engineering; that of Mechanical Engineer in Electrical Engineering on those who have completed the Course in Electrical Engineering; that of Engineer of Mines in Ceramics on those who have completed the Course in Ceramics.

The degree of Bachelor of Science in Industrial Arts is conferred on students who have completed the Course in Industrial Arts; that of Bachelor of Science in Chemistry or Metallurgy on those who have completed the Course in Chemistry.

Except by unanimous consent of the Faculty, no candidate for graduation will be recommended for a degree whose record is not in all respects complete by the Friday evening previous to the Commencement Day on which he seeks the degree.

EXPENSES.

Fees.

Each student is required to pay an incidental fee of fifteen dollars a year, and the usual fees for the expenses of laboratory work. Tuition is free.

Laboratory Fees.—Students in the laboratories and shops are required to pay fees to cover, in part, the cost of the material consumed, and the deterioration of the expensive instruments used by them. The fees charged per term in the laboratories mentioned below are as follows:

Ceramics, 4, 5, 6, 9, 10, 11, 12	$5 00
Drawing, 7	2 00
Electrical Engineering, 4 and 5 (4 or 5 hrs.), $7.00; (3hrs. or less)	5 00
Gymnasium	1 00
Shop Work, 4 hrs. or less	5 00
Shop Work, 5 hrs. or more	7 00
Mechanical Engineering, 12, 13, 14, 15, 16, 17	5 00
Physics, 5, 6, 7, 9 (3 hrs), $5.00; (over 3 hrs.)	7 00

In the laboratories of the Department of Chemistry, Ceramics and Metallurgy, each student is required at the beginning of each term to pay a fixed charge of one dollar and fifty cents for gas and water. He is also required to buy his own supplies, which may be obtained at the storeroom in Chemical Hall. With reasonable care, this expense need not exceed $5.00 per term.

All term dues must be paid at the opening of each term as a condition of admission to classes.

A fee of five dollars to cover expenses of graduation, diplomas, etc., is required of each person receiving one of the ordinary degrees from the University, and this fee must be paid before the degree is conferred.

Other Expenses.

There are two dormitories on the University grounds for the use of students. Each occupant is charged by the University a rent of one dollar and fifty cents a term.

The South Dormitory affords unfurnished rooms to such students as desire to board themselves, and thus to reduce their expenses to a minimum. The expense of living in this way falls below two dollars per week. Applications for rooms should be made to the President of the University.

The North Dormitory will accommodate more than sixty students. Board, furnished rooms, fuel, light and washing are, at present prices, supplied for about three dollars and twenty-five cents a week. Students will be admitted on special recommendation to the President of the University.

Boarding clubs are also formed in the neighborhood of the University. Furnished rooms are rented at seventy-five cents to one dollar a week for each student, and the cost of board is two dollars to three dollars a week.

Board, with furnished rooms, can be obtained in private families, within convenient distances of the University, at rates varying from four dollars to five dollars a week. The ruling rate may be taken as four dollars.

The uniform with which the members of the battalion are required to provide themselves costs about fourteen dollars. It is quiet in pattern, and is designed to be worn daily in place of civilian dress.

The expenses of a student in this College for a year may be estimated as follows, excluding clothing (except uniform) and traveling expenses:

	Low.	Average.	High.
Incidental fees	$ 15 00	$ 15 00	$ 15 00
Laboratory fees	15 00	15 00	54 00
Books and stationery	15 00	25 00	40 00
Room	4 50	37 00	75 00
Furniture	10 00	......	......
Board	70 00	110 00	150 00
Uniform	14 00	14 00	14 00
	$143 50	$216 00	$348 00

The second and third estimates for room include light, fuel and care. The third estimate is for a room occupied by a single student. The requirements for laboratory fees and books depend upon the course of study pursued.

SELF-SUPPORT.

There is a large amount of work upon the University farm which is assigned to students, preference being given to those who are studying Agriculture. But the University cannot promise work to all applicants. Many students find work in private families, in offices, and in various occupations, by means of which they defray at least a portion of their expenses. A person of ability and energy, who is master of a trade, or who can do good work of any kind, can generally find remunerative employment. It has seldom been known that any student of ordinary energy and industry was obliged to leave the University because of a lack of money for necessary expenses, after having been sixty days on the ground—or long enough to inform himself as to the opportunities for securing employment. An employment bureau is maintained at the University, where the names of those seeking work and of those desiring workers are recorded.

For further information, address "Executive Office, State University, Columbus, Ohio."

ENROLLMENT

1897-1898

Graduate Students	2
Four-Year Courses	264
Course in Architecture	11
Short Course in Mining	11
Short Course in Ceramics	12
Short Course in Industrial Arts	2
Total	302

Directory of Graduates

A

Ackerman, Eli Osborn, 1884, C. E., 2664 North High street, Columbus, Columbus Street Railway Co.

Ackerman, Fremont, 1883, C. E., Los Angeles, Cal., civil engineer.

Aldrich, Edgar S., 1897, E. E., Columbus.

Alexander, St. Clair, 1893, M. E., Bridgeport.

Alsdorf, Percy Reed, 1896, E M., Central City, Col., Standard Assay Office.

Alsdorf, Frederick Charles, 1892, E. M., Central City, Col., general manager, DuQuesne Mining Co.

Arnold, Edwin Ebert, 1898, M. E., Zanesville.

Auld, James A., 1897, E. E., Columbus.

B

Barcus, Miner, 1897, E. E., Columbus.

Barnaby, Charles London, 1898, C. E.

Barrows, Harry Holbrooke, 1898, C. E., Columbus.

Bartholomew, Clyde Stanley, 1896, C. E., Newark, civil engineer, B. & O. Railway.

Beach, David Price, 1895, C. E., Pittsburg, Pa., in employ of Pennsylvania Railroad.

Beck, Arthur Andrew, 1893, C. E., Columbus, county surveyor's office.

Belden, Sanford Bonner, 1895, E. M., Chicago, Ill., with Chicago Electric Mining Engineering Co.

Biebel, Herman Matthews, 1896, M. E.

Bissing, William, 1893, M. E., Washington, D. C., patent office.

Blackburn, Frank H., 1896, M. E., New Vienna.

Bloom, J. George, 1889, C. E., Cincinnati, assistant engineer, B. & O. S. W. R'y.

Bower, Jerome G., 1897, M. E. Waynesburg, Pa.

Bradford, Joseph Nelson, 1883, M. E., 54 West Tenth avenue, Columbus, associate professor of drawing, State University.

Brown, Frederick W., 1888, E. M., Bellefontaine, superintendent Buckeye Portland Cement Co.

Brown, Newton H., 1893, M. E., fellow, Cornell University.

Brumley, David Joseph, 1895, C. E., Evansville, Ind., with L. & N. R'y.

Bruning, Henry Dietrick, 1896, C. E., Columbus.

Buckman, Arthur Leslie, 1897, E. E., Norwalk.

Burns, James Ferguson, 1891, C. E., Evansville, Ind., assistant engineer, L. & N. R'y.

C

Calkins, George Herbert, 1895, M. E., Columbus.
Capron, Marshall Fremont, 1888, M. E., Kenton, architect.
Carr, Hugh Stanley, 1896, E. E., Yellow Springs.
Carroll, Patrick Henry, 1894, E. M., Houtzdale, Pa.
Carson, Samuel King, 1895, M. E., Columbus, student, Ohio Medical University.
Catlin, Homer Clark, 1896, C. E., Toledo Bridge Co.
Cellarius, Frederick Julius, 1888, C. E., Dayton, civil engineer.
Chappell, Walter Evans, 1898, E. E., Barnesville.
Cilley, Raymond, 1896, C. E., Cincinnati.
Coddington, Edwin F., 1896, C. E., 1897, M. Sc., fellow in Astronomy, Lick Observatory, Mount Hamilton, California.
Cole, George Nathan, 1891, M. E., Chicago, Ill.
Collins, Curtis, 1895, M. E.
Connell, William A., 1886, E. M., Portsmouth.
Conway, Hugh Lawrence, 1896, C. E., Springfield.
Cope, Albert N., 1897, E. E., Kingston.
Covell, Vernon Royce, 1895, C. E., Pittsburg, Pa.
Cunningham, Edward Walter, 1894, C. E., Chicago, United States Engineer's office.

D

Damron, Carson W., 1897, M. E., Gallipolis.
Davis, Charles William, 1894, E. M., Colorado Springs, Col.
Davis, Oscar Allen, 1897, E. E., Alliance.
Deahl, Walter Smith, 1896, C. E., Columbus.
DeLoffre, Andre, 1896, E. E., Fort Logan, Col.
Diemer, Hugo, 1896, E. E., Cincinnati, Diemer & Hebble, electrical contractors.
Donham Maurice, 1896, M. E., Cincinnati.
Dun, John J., 1883, E. M., Fifteenth avenue, Columbus, of Columbus Construction Co.
Dunlap, Thaddeus Cox, 1895, M. E., assistant engineer, U. S. S. Indiana.
Dunnick, Edward, 1897, C. E., Columbus,

E

Estep, Frank Leslie, 1898, E. E., Jeffersonville.
Erskine, John H., 1886, E. M., Lowellsville, fire brick manufacturer.
Evans, Peter Platter, 1892, C. E., Cleveland, engineer C. L. & W. Railroad.
Eysenbach, Ernest, 1896, E. M., Columbus, superintendent Columbus Gas Company.

F

Feicht, Russell Stimson, 1890, M. E., Philadelphia, Pa., Philadelphia Traction Co.
Fergus, Guy Carlton, 1898, E. E., Tadmor.

Fish, Fred Alan, 1898, E. E., Milan.

Floto, Julius, 1889, E. M., Chicago, Ills.

Flynn, Benjamin Harrison, 1898, C. E., Columbus.

Flynn, Harry Franklin, 1892, C. E., Washington, D. C., computer U. S. Geodetic and Coast Survey.

Foster, Frank McMillan, 1894, M. E., Blanchester.

Fowler, Harry R., 1894, M. E.

Fox, John Herbert, 1897, M. E., Columbus, fellow Industrial Arts, State University.

Fravel, George B., 1888, M. E., Indianapolis, Ind., assistant master mechanic, Pan Handle shops.

Frayer, Lee Ambrose, 1896, M. E., Greenwich.

Freeman, Stanton Sholes, 1898, E. M., Columbus, Battery H, First O. V. Artillery.

French, Thomas Ewing, 1895, M. E., Columbus, assistant professor in drawing, State University.

G

Gallen, William Francis, 1897, M. E., Columbus.

Garber, John Murray, 1897, C. E., Belleville.

Gee, Eugene C., 1897, E. E., Wheeling, W. Va.

Gehrkens, Edward Frederick, 1894, E. E., Schenectady, N. Y., with General Electric Co.

Given, James Byron, 1896, E. E., 141 South Water street, Chicago, Ill.

Goddard, Loring Hapgood, 1892, C. E., Columbus, architect.

Goodell, Ralph Spencer, 1892, C. E., Columbus, draughtsman Columbus Bridge Co.

Graham, Emery Eugene, 1898, E. E., Richwood.

Grate, Charles Artemus, 1898, M. E., Yale.

Green, Jerome Joseph, 1893, M. E., South Bend, Ind., Notre Dame University, professor in charge of electrical department.

Gregory, Hiram D , 1880, E. M., attorney-at-law, Grayson, Ky.

Griffin, Mark H., 1897, E. E., Xenia, electrical engineer Soldiers' and Sailors' Orphans Home.

Groves, John Wesley, 1898, C. E., Batavia.

H

Haas, Frank, 1895, C. E., 1896, E. M., assistant in metallurgy, State University.

Hale, Frederick James, 1898, M. E., Mogadore.

Hall, Harry R., 1889, E. M., Dunbar, Pa., assistant general manager Dunbar Furnace Co.

Harrison, William Henry, 1885, C. E., Anaconda, Montana.

Hartwell, Arthur, 1888, M. E., Pittsburg, Pa., electrical engineer Westinghouse Electrical and Manufacturing Co.

Hartwick, Louis M., 1897, M. E., Marietta.

Hassler, Robert Hanich, 1892, M. E., Dayton.

Hayward, George E., 1893, C. E., New Philadelphia, engineer, C. L. & W. Ry.

Hazlett, Robert Jr., 1887, C. E.

Hebble, Charles Roy, 1896, E. E., Cincinnati, Diemer & Hebble, electrical contractors.

Heller, Albert Henry, 1890, C. E,

Henderson, Adelbert Andrew, 1898, C. E., Olentangy.

Henretta, Charles Michael, 1896, E. M., Buffalo, Guernsey county, O., engineer James W. Ellsworth & Co.

Hewitt, Strafford Reeves, 1898, E. E., Columbus.

Hine, Lucius A., 1888, E. M., Chicago, Ills., manufacturer light castings, etc.

Hipple, John Merton, 1898, E. E., Jefferson.

Hirsch, Gustav, 1897, E. E., Columbus.

Homan, Frank, 1895, C. E., New Straitsville, engineer.

Howells, E. S., 1884, E. M., Massillon, O.

Howells, Thomas J., 1897, E. M., Martins Ferry.

Hunt, William Franklin, 1887, M. E., attorney-at-law, New York Life Building, St. Paul, Minn.

Hyle, Charles A., 1896, E. E., ærial observer, weather bureau, Lansing, Michigan.

I

Ireland, Guy Llewellyn, 1895, M. E., Cincinnati.

Irvin, Chadwick H., 1897, M. E., Columbus,

J

Jenkins, William B., 1893, C. E., Wilmington, Columbus and Athens Ry.

Jenkins, Willis H., 1894, C. E , New York City, engineer, Street Cleaning Department.

Jennings, Levi E., 1897, E. E., Eaton.

Johnson, Charles W., 1896, E. E., Cincinnati.

Johnson, George Edward, 1892, C. E., 67 E. State street, Columbus, N. & W. Ry.

Johnson, Herbert Lincoln R., M. E., Cincinnati, General Electric Co.

Jones, Arthur James, 1898, E. E., Fitz Henry, Pa.

Jones, Alexander Houston, 1895, M. E., Cleveland.

Jones, Pearl N., 1892, M. E., Pittsburg, Pa., Westinghouse Electrical and Manufacturing Co.

Jones, Smiley, 1894, E. M., Downieville, Cal., electrician Gold Bluff mine.

Judd, Horace, 1897, M. E., Columbus, fellow in Mechanical Engineering, State University.

K

Keffer, Frederick, 1892, E. M., Anaconda, B. C. Supt. Boundary Creek Mining Co.

Kemmler, Edward A., 1888, C. E., 895 S. High street, Columbus, assistant city engineer.

Kerr, Samuel Thompson, 1894, M. E., Martin's Ferry, superintendent Electric Light plant.

Kester, Fred. Edward, 1895, M. E., Columbus, assistant in Physics, State University.

Kiesewetter, Frank Louis, 1891, C. E., Columbus, Ohio State Savings Bank.

Kline, Charles, H., 1897, E E., Dayton.

Knecht, Arthur Edward, 1898, M. E., Cincinnati.

Krumm, Louis Ralph, 1898, E. E., Columbus.

Kuhn, Vallie Howard, 1896, E. E., Etna.

L

Lamme, Benjamin G., 1888, M. E., Pittsburg, Pa., engineer Westinghouse Electrical and Manufacturing Co.

Lamme, Bertha A., 1893, M. E.. Pittsburg, Pa., Westinghouse Electrical and Manufacturing Co.

Large, Joseph H., 1890, C. E., Pittsburg Pa., assistant inspector of bridges Pennsylvania Southwest system.

Lee, Robert M., 1897, M. E., Columbus.

Levering, Orpheus D., 1893, M. E., Winchester, Mass., The McKay Metallic Fastening Association.

Lincoln, Paul Martyn, M. E., Niagara, N. Y., superintendent the Cataract Construction Co.

Lindo, William C., 1896, C. E., Montague, Jamaica.

Logan, Lavallette Lasea, 1896, E. M., Portage, Pa., professor National Correspondence School, Scranton, Pa.

Lott, Charles Milford, 1895, M. E.

Lovejoy, Ellis, 1885, E. M., Union Furnace, chemist and superintendent Columbus Brick and Terra Cotta Co.

M

Mackey, Ure LaVerne, 1893, M. E., (B. A., Wooster University), Allegheny, Pa., student in United Presbyterian Theological Seminary.

Manley, Rush Emmett, 1894, M. E.

Martin, George, 1897, E. E., Norwalk, Central Union Telegraph Co.

Martin, Percy, 1892, M. E., with Ludw. Loewe & Co., Martinikenfelde, Kaiserin Augusta Allee, Berlin, N. W., Germany.

Marvin, Charles Frederick, 1883, M. E., Washington, D. C., U. S. Weather Bureau.

Masters, George Albert, 1886, C. E., Toledo.

Matson, William Edgar, 1896, E. E., Lynn, Mass.

McAllen, William Johnson, 1894, C. E., Pittsburg, Pa,

McCarter, Robert Dale, Jr., 1895, M. E., Schenectady, N. Y., with General Electric Co.

McCormick, J. H., 1880, M. E., Dayton, O., with National Cash Register Company.

McCormick, William Francis, 1896, M. E., Columbus.

McGrew, John Alexander, 1895, C. E., engineer, with Pennsylvania Railroad Co.

McGuffey, Francis Hoyt, 1894, M. E., McGuffey.

McIntire, Alfred Heber, 1898, E. E., Mt. Vernon.

McNary, George Bull, Jr., 1896, E. E , Toledo.

Menough, Arthur George, 1894, E. M., Wellsville.

Mercer, Frank Emmet, 1896, E. E., Wauseon.

Mershon, Ralph D., 1890, M. E., Pittsburg, Pa., Westinghouse Electrical and Manufacturing Co.

Miller, Frank Case, 1893, C. E., Columbus, assistant engineer C. S. & H., Short Line Division.

Miller, Harry Franklin, 1889, M. E.

Morris, Clyde Tucker, 1898, C. E., Columbus.

Morrison, Robert O., 1893, C. E., Cincinnati.

Morton, George L., 1884, M. E., (LL. B., Nat'l Law School) patent office, Washington, D. C., first assistant examiner dep't electricity.

Munn, Mortimer Adam, 1894, C. E., Mansfield, city engineer.

Myers, Ord, 1895, M. E.

Myers, Roy V., 1893, C. E., New Straitsville, with Columbus and Hocking Coal and Iron Co.

Myers, Uriah H., 1887, E. M., Allegheny, Pa., chemist, Marshall Kennedy Milling Co.

N

Nagel, William G., 1895, M. E., Toledo.

Newton, Samuel Donald, 1895, C. E.

O

O'Brine, David, 1881, B. Sc., M. Sc., E. M., D. Sc., M. D., Urbana, physician.

Orton, Edward, Jr., 1884, E. M., Columbus, director of the department of Clay-working and Ceramics. State University.

P

Palmer, Walter K., 1893, M. E., State University, Lawrence, Kansas.

Patch, Homer Austin, 1896, C. E., Youngstown.

Payne, Halbert Edwin, 1887, M. E., New York City, American Typewriter Company.

Pearl, Allen Sexton, 1894, M. E., Chicago, Ill., Central Electric Company.

Pedlow, Edward Benjamin, 1893, C. E., New Straitsville, chief engineer, Columbus and Hocking Coal and Iron Co.

Peirce, John Mattinson, 1895, M. E.

Pence, David Arrel, 1894, M. E., Lowellville.

Peters, William Lincoln, 1885, M. E., Riverside, Cal., manufacturer.

Pilcher, Hastings Moore, 1895, M. E.

Pleukharp, Charles V., 1885, M. E., Columbus, pastor South High street M. E. Church.

Postle, Herman R., 1894, C. E., Columbus, teacher.

Powell, Charles S., 1893, E. E., Columbus, Westinghouse Electrical Manufacturing Co.

R

Ray, Frank A., 1887, E. M., The Dennison, Columbus, associate professor of Mine Engineering, State University.

Ray, William M., 1893, C. E., Room 825, Hickox Bld., Cleveland.

Raymond, Coles Abel, 1894, C. E., Youngstown.

Reed, Robert Browning, 1896, E. E., Troy, electrical engineer.

Reed, William Allen, 1897, E. M., Central City, Colo., assaying offices Alsdorf & Paul.

Reeves, Archibald C., 1887, C. E., 153 Superior avenue, Dayton.

Rice, Herbert A., 1897, C. E. Columbus.

Riddle, Howard Sterling, 1897, E. E., Columbus.

Roberts, Cyrus Swan, 1898, E. M., Columbus.

Robinson, Erdis Geroska, 1893, C. E., Pineville, La., assistant engineer K. C., W. & G. Railroad.

Rogers, James Bertrand, 1896, E. M., Youngstown.

Root, Willis J., 1885, E. M., Columbus, chemist, King, Gilbert & Warner Steel Co.

Rowlee, Henry A., 1897, M. E., Lorain.

Ruhlen, Carl Marble, 1898, M. E., Fort Riley, Kansas.

S

Schaub, Edward Louis Tascher, 1885, M. E., Dennison, with P. C. C. & St. L. R. R.

Schaup, Charles E., 1897, E. M., Syracuse, N. Y., in Electric Railway work.

Scheibell, William O., 1888, E. M., Upper Sandusky, O., manufacturer artificial stone.

Schroll, Otto, 1886, C. E., Wheeling, W. Va., civil engineer.

Sedgwick, Edward Crayton, 1895, M. E.

Serva, Adam A., 1893, M. E., Philadelphia, Pa., with Ft. Wayne Electric Co., Philadelphia Branch.

Sharp, Charles C., 1888, C. E., Corning, superintendent mining department, Sunday Creek Coal Co.

Sherman, Christopher Ellis, 1894, C. E., Columbus, assistant professor in civil engineering, State University.

Simonton, Mark, 1895, M. E.

Skinner, Charles E., 1890. M. E., box 435, Wilkinsburg, Pa., Westinghouse Electrical and Manufacturing Co.

Sperr, Frederick W., 1883, E. M., Houghton, Mich., professor of civil and mining engineering, Michigan School of Mines.

Spurrier, John Randolph, 1896, E. E., Columbus, fellow in electrical engineering, State University.

Stewart, Lee Raymond, 1896, C. E., Youngstown Bridge Works.

Stewart, Harford Toland, 1896, E. E., Schenectady, N. Y.

Stinebaugh, Isaac Long, 1892, C. E.

Storer, Norman Wilson, 1891, M. E., Pittsburg, Pa., Westinghouse Electrical and Manufacturing Co.

Storer, Simon B., 1893, M. E., Niagara, N. Y., with Niagara Cataract Construction Co.

Stull, Emmett Willet, 1894, M. E., Elkland, Pa., electrician.

Stump, John William, 1895, C. E.

T

Taylor, Arthur W., 1894, E. M., Cleveland, chemist for Cleveland Furnace Company.

Thomas, James O., 1897, C. E., Columbus.

Tomlinson, James Rowe, 1892, C. E., Chillicothe.

Towne, Robert S., 1879, B. Sc., E. M., 20 Nassau street, New York, N. Y., president Mexican Northern Railway.

Turner, Arthur M., 1893, M. E.

U

Urban, Harry Marshall, 1898, C. E., Ashland.

V

Vandervoort, William P., 1886, E. M., Morrow, superintendent of schools.

Viets, Willis B., 1886, E. M., Parryville, Pa., chemist Carbon Coal and Iron Co.

W

Wadsworth, F. L., Olcutt, 1888, B. Sc., E. M., M. E., Chicago, Ill., assistant professor of astro-physics, University of Chicago.

Walker, James Madison, 1896, C. E., Wedonia, Ky.

Watt, Sern P., 1886, M. E., Columbus, Rarig Manufacturing Co.

Weick, Charles William, 1898, B. Sc. (Ind. Arts), assistant in the Industrial Department, Ohio State University.

Welch, Clark J., 1888, C. E., Youngstown, bridge engineer.

Welch, Oliver Bartlet, 1895, M. E.

Wilcox, Alvah Newton, 1885, M. E., Dayton.

Wise, Albert Joseph, 1898, C. E., Suffield.

Wolf, Herman Howard, 1895, C. E., ensign U. S. Navy.

Z

Zaumseil, Oscar C., 1887, C. E., 126 Seeley avenue, Chicago, Ill, architect.

Zurfluh, William Nicholas, 1894, M. E., Toledo, teacher in High School.

List of Graduates from other Colleges of the Ohio State University who are now doing Engineering Work.

Converse, Howard Pendleton, 1887, B. Sc., 166 Devonshire street, Boston, Mass., manager Boston office Cooper, Hewitt & Co., steel and iron manufacturers.

Evans, Ernest, 1892, B. Sc., Mingo Junction, Ohio, chemist Laughlin Junction Steel Co.

Humphrey, J. Scott, 1879, B. Sc., Findlay, Ohio, civil engineer.

Jones, Jesse Lee, 1890, B. A., Philadelphia, Pa., chemist William Cramp & Sons, ship builders.

Kirker, Harry L., 1889, B. Sc , Philadelphia, Pa., electrical engineer.

Knopf, George W., 1883, B. Sc , Pittsburg, Pa., bridge builder.

Lovejoy, Jesse R., 1884, B. Sc., Schenectady, N. Y., with General Electric Company.

McDowell, John Andrew, 1882, B. Sc., Columbus, O., chemist and superintendent Portland Cement Co.

Mix, Edgar W., B. Sc., Paris, France, electrical engineer, representing the General Electric Co.

Newton, Henry S., 1889, B. Sc., mechanical and electrical engineer, Syracuse, N. Y.

Phelps, Cyrus Alba, 1892, B. Sc., Sombereto, Jacataccas, Mexico, with Sombereto Mining and Milling Co.

Ritchey, Joseph C., 1890, B. Sc., Mingo Junction, with Junction Iron and Steel Co.

Scott, Charles Felton, 1885, B. A., Pittsburg, Pa., chief electrician Westinghouse Electric and Manufacturing Co.

Short, Sidney H., B. Sc., Cleveland, O., electrical engineer and vice president of Walker Manufacturing Co.

Ward, John C., 1880, B. A., Painesville, O., engineer and surveyor.

Wikoff, John Burkett, 1884, B. Ph., Cambridge, assistant to general manager Cleveland & Marietta Railway Co.

Directory of those who Completed Short Courses.

Adams, John Carroll, ceramics, 1897, Lynchburg, Va., with I. H. Adams, brick manufacturer.
Bleininger, Albert Victor, ceramics, 1897, Shawnee, N. B. M. A., scholarship for 1897-8.
Braddock, Everett F., ceramics, 1896, Richfield, O.
Campbell, Augustine Ray, ceramics, 1898, Metuchen, N. J.
Giessen, Carl, ceramics, 1896, Canton, O., superintendent Royal Brick Co.
Gorton, Elmer Ellsworth, ceramics, 1896, Terra Cotta, Ills., chemist American Terra Cotta and Ceramic Co.
Jones, Edward F., ceramics, 1896, Zanesville, O., A. O. Jones Brick and Terra Cotta Co.
Purdy, Ross C., ceramics, 1898, Buffalo, N. Y.
Anderson, Arthur, mining, 1888, Shawnee, O.
Blower, J. W., mining, 1892, Bunola, Pa.
Boyd, Arthur, mining, 1893, Thurman, W. Va., superintendent Thurman Coal Co.
Brophy, John S., mining, 1896, Frostburgh, Md., superintendent mines.
Carroll, Patrick, mining, 1891, Houtzdale, Pa.
Dixon, C. F., mining, 1890, Phillipsburg, Pa.
Evans, John M., mining, 1895, Shawnee, O.
Fyfe, John, mining, 1891, Houtzdale, Pa.
Gildroy, R. E., mining, 1891, Whatcheer, Ia.
Harrigan, Patrick, mining, 1898, Darlington, Pa.
Herron, J. S., mining, 1893, Walkersville, Pa.
Jenkins, Jonathan, mining, 1891, Frostburgh, Md.
Laviers, Henry, mining, 1893, Jackson, O., engineer Superior Coal Co.
Lochrie, John, mining, 1890, Houtzdale, Pa.
McKey, R. F., mining, 1894, Coal Glenn, Pa.
Moss, James, mining, 1891, Byersville, O.
Newton, E. A., mining, 1893, Jeffries, Pa.
Nichols, J. L. D., mining, 1895.
Oakes, C. H., Jr., mining, 1892, Jackson Center, Pa.
Phillips, F. R., mining, 1893, Laonoconing, Md.
Quigley, John, mining, 1893, Westville, Pa.
Quigley, Robert, mining, 1894, Westville, Pa.
Quinn, John, mining, 1891, Houtzdale, Pa.
Ralston, William, mining, 1896, Newman, O.
Rees, David, mining, 1891, Cleveland, O.
Rees, Evan, mining, 1895, Jacksonville, O., mine surveyor.
Snedden, James, mining, 1892, Antrim, Pa.
Tetlow, W. A., Mining, 1892, Washingtonville, O.
Wright, John, mining, 1892, Antrim, Pa.

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UNIVERSITY BULLETIN SERIES 4—No. 16

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

OHIO STATE UNIVERSITY

1899-1900

Entered at the Postoffice at Columbus, Ohio, as second-class matter

OHIO STATE UNIVERSITY

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

COURSES OF INSTRUCTION
BUILDINGS
EQUIPMENT
FACULTY
ALUMNI
STUDENTS

1899-1900

COLUMBUS
Published by the University
July, 1899

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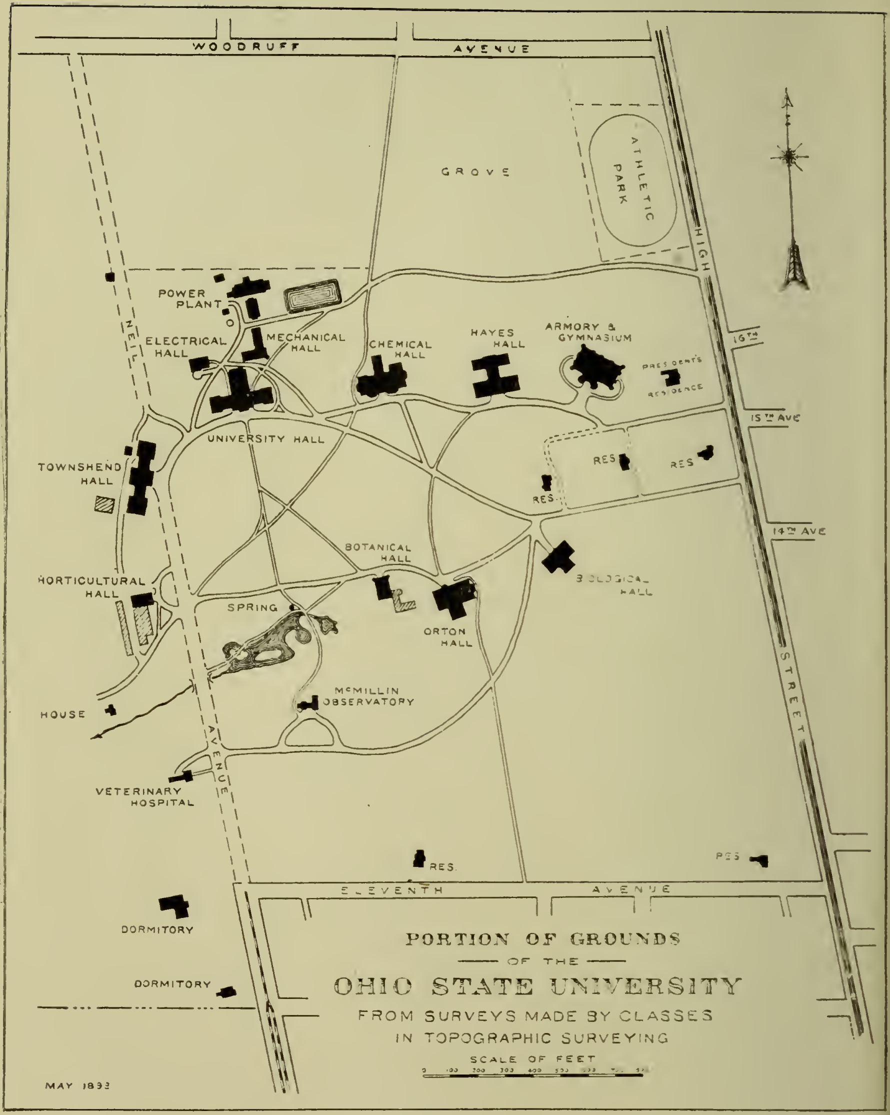

PORTION OF GROUNDS
OF THE
OHIO STATE UNIVERSITY
FROM SURVEYS MADE BY CLASSES
IN TOPOGRAPHIC SURVEYING

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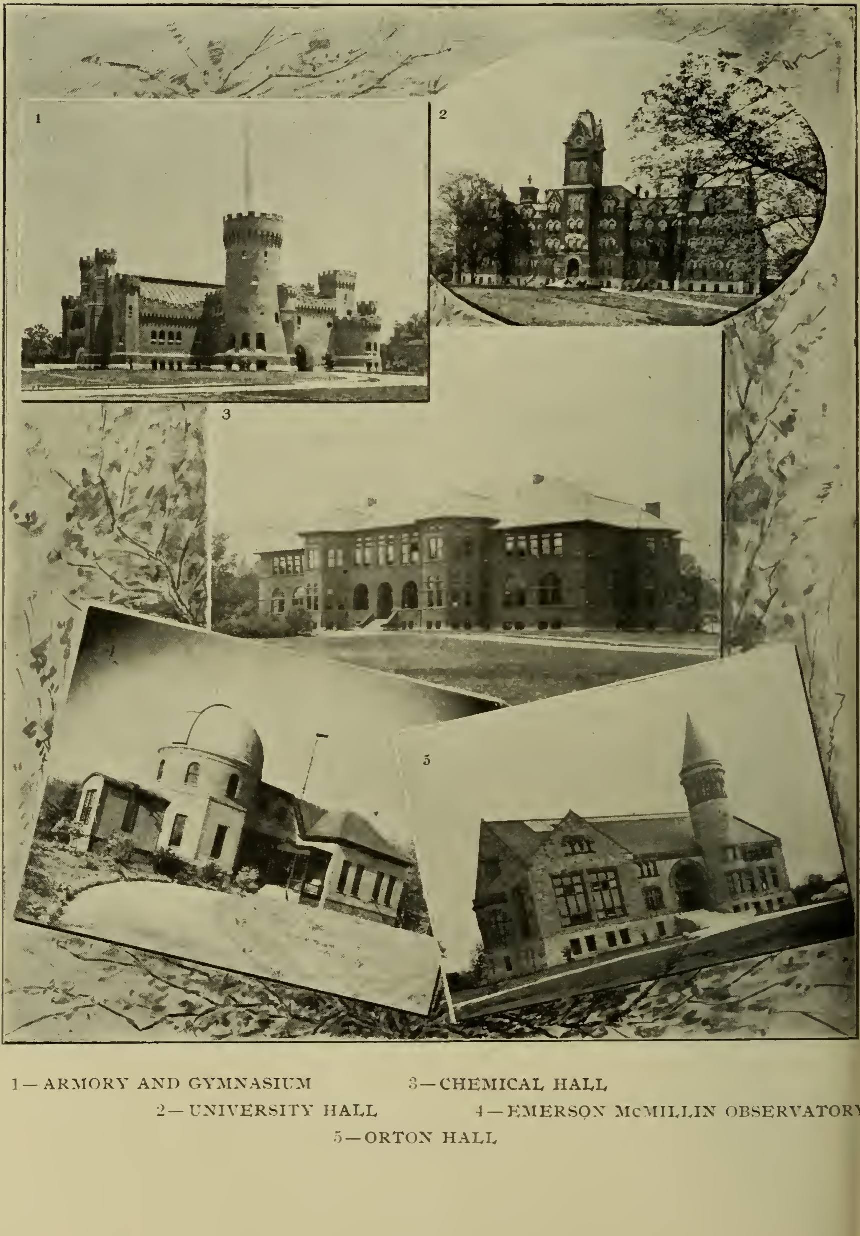

1—ARMORY AND GYMNASIUM 3—CHEMICAL HALL
2—UNIVERSITY HALL 4—EMERSON McMILLIN OBSERVATORY
5—ORTON HALL

The Ohio State University

Under an act of Congress passed July 2, 1862, the State of Ohio received from the United States a large grant of the public lands for the purpose of establishing a "college where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such a manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In accordance with this act, the Ohio State University was founded by the State as a public institution of learning. The governing body of the institution is a Board of Trustees, appointed by the Governor of the State for terms of seven years, as provided in the law organizing the University. The original endowment has been supplemented, and the objects of the University promoted, by a permanent annual grant from the United States, under an act of 1890, by special appropriations of the General Assembly; and in 1891, by a permanent annual grant from the State, which grant was doubled by the Legislature of 1896. Through the aid which has been received from the United States and from the State it is enabled to offer its privileges, with a slight charge for incidental expenses, to all persons of either sex who are qualified for admission.

The University is divided into six colleges as follows:

The College of Agriculture and Domestic Science.
The College of Arts Philosophy and Science.
The College of Engineering.
The College of Law.
The College of Pharmacy.
The College of Veterinary Medicine.

Each of the above named colleges is under the direction of its own Faculty, which has power to act in all matters pertaining to the work of the students of that particular college. The aim of the University is to give to the young men and women of Ohio the largest possible opportunity for both general and special training, in order to prepare them for the various duties of life.

The University is situated within the corporate limits of the city of Columbus, two miles north of the Union Depot and about

three miles from the State Capitol. The University grounds consist of three hundred and thirty acres. The western portion, about two hundred acres, is devoted to agriculture and horticultural purposes, and is under the management of the College of Agriculture and Domestic Science. The eastern portion is occupied by the principal University buildings, eleven in number, the campus, athletic and drill grounds, a park-like meadow, and a few acres of primitive forest.

The College of Engineering

Since the inception of the University, the College of Engineering has manifested a vigorous and steady growth. To a large extent this growth represents the demand of the people from whom the University derives its support, for it has been the constant policy of the University to enlarge and foster each branch of educational work in response to every intelligent demand.

Yet it is true that the State has advanced and shaped public opinion by providing educational facilities somewhat in advance of public demand. Through its University it has established and built up a system of technical education which is more important than any other single agency in the development of the commercial and industrial interests of Ohio. The marvelous industrial progress made in this State and country in recent years is the best indication of the benefits which have already begun to accrue from the enlargement of technical training, and from its constant subdivision and expansion.

At present the College offers instruction in nine important fields of Engineering work. Covering these, the following four year courses of study are given:

1. Civil Engineering, leading to the degree of Civil Engineer. (C. E.)
2. Mining Engineering, leading to the degree of Engineer of Mines. (E. M.)
3. Mechanical Engineering, leading to the degree of Mechanical Engineer. (M. E.)
4. Electrical Engineering, leading to the degree of Mechanical Engineering in Electrical Engineering. (M. E. in E. E.)

5. Ceramics, leading to the degree of Engineer of Mines in Ceramics. (E. M. in Cer.)

6. Industrial Arts, leading to the degree of Bachelor of Science in Industrial Arts. (B. Sc.)

7. Chemistry, leading to the degree of Bachelor of Science in Chemistry or Metallurgy. (B. Sc.)

The following short courses do not lead to degrees, but students completing them are furnished with formal certificates setting forth the work they have accomplished:

8. Architecture, three years.
9. Mining, two years.
10. Clay-working, two years.
11. Industrial Arts and Shopwork, two years.

The instruction necessary to the completion of these various courses of study is given in seventeen different departments, under fifty-seven professors and assistants. In addition, in some of the courses in this College elective work is offered, which may be taken from any of the thirty-five departments of the University.

The various departments of the College of Engineering, or shared by this College, occupy about two-thirds of Chemical Hall, nearly the whole of Hayes Hall, the whole of the Mechanical and Electrical buildings, portions of Orton Hall and of the main University building. The equipment for teaching technical and scientific subjects is, in the main, excellent, and in some departments is exceptional. In all departments the annual increase in apparatus and facilities is rapidly making the equipment more perfect and complete.

The Library of the University, consisting of about 31,000 volumes and 10,000 unbound publications, is able to fill the demands of the Engineering students for the most important treatises in their respective fields of science.

DAYS AND DATES

1899

Entrance Examinations (8 A. M)	Monday,	September 11.
Registration	Tuesday,	September 12.
Lectures and Class-work begin	Wednesday,	September 13.
Meeting of Trustees	Wednesday,	September 20.
Thanksgiving Recess	Thursday, Friday,	November 30. December 1.
First Term ends	Wednesday,	December 20.
Christmas Vacation.		

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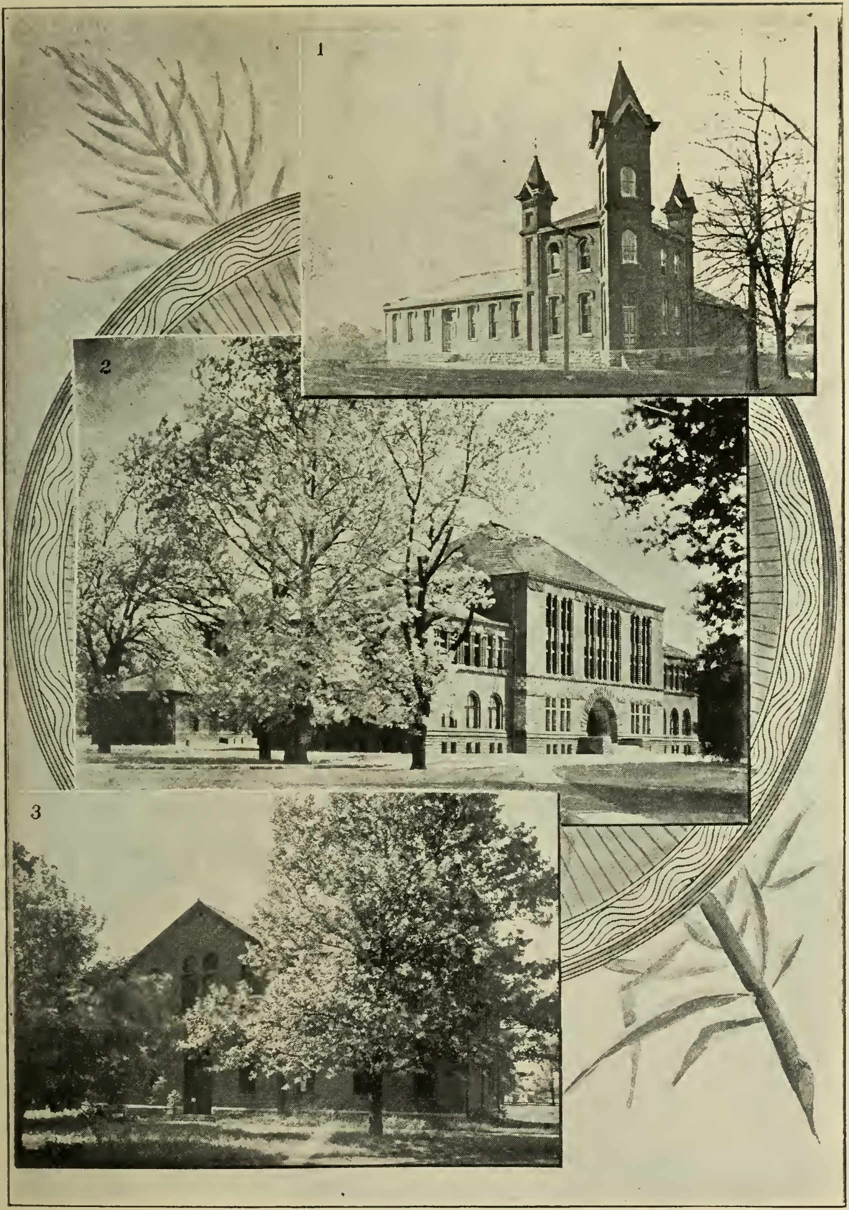
Second Term begins	Wednesday,	January 3.
University Day	Thursday,	February 22.
Second Term ends	Friday,	March 23.
Third Term begins	Monday,	March 26.
Spring Recess.		
Meeting of Trustees	Wednesday,	April 4.
High School Day	Friday,	May 18.
Senior Vacation begins	Saturday,	May 19.
Field Day—Athletic Association	Saturday,	May 19.
Competitive Drill, Cadet Battalion	Saturday,	May 26.
Memorial Day	Wednesday,	May 30.
Final Examinations (all Colleges)	Monday to Friday,	June 4. June 8.
Baccalaureate Sermon	Sunday,	June 10.
Entrance Examinations (8 A. M.)	Monday, Tuesday,	June 11. June 12.
Class Day	Monday,	June 11.
Meeting of Trustees	Tuesday,	June 12.
Alumni Day	Tuesday,	June 12.
COMMENCEMENT	Wednesday,	June 13.
Summer Vacation.		
Entrance Examinations (8 A. M.)	Monday,	September 17.
Registration	Tuesday,	September 18.
Lectures and Class-work begin	Wednesday,	September 19.
Meeting of Trustees	Wednesday,	September 26.



1—MECHANICAL HALL

2—HAYES HALL

3—ELECTRICAL BUILDING

FACULTY OF THE COLLEGE OF ENGINEERING

REV. WILLIAM OXLEY THOMPSON, D. D..................University Grounds.
President of the University.

NATHANIEL WRIGHT LORD, E. M., Dean..........338 West Eighth Avenue.
Professor of Metallurgy and Mineralogy and Director of the School of Mines

EDWARD ORTON, Ph. D., LL. D..............................100 Twentieth Street
Professor of Geology.

SIDNEY AUGUSTUS NORTON, Ph. D., LL. D...........363 East Town Street
Lecturer in Chemistry.

BENJAMIN FRANKLIN THOMAS, Ph. D.....................University Grounds
Professor of Physics.

ROSSER DANIEL BOHANNAN, B. SC., C. E., E. M...16th and Indianola Aves.
Professor of Mathematics.

C. NEWTON BROWN, C. E...................................1343 Forsythe Avenue.
Professor of Civil Engineering.

ERNST AUGUST EGGERS..................................University Grounds.
Professor of the Germanic Languages and Literatures.

BENJAMIN LESTER BOWEN, Ph. D.........................46 Jefferson Avenue.
Professor of the Romance Languages and Literatures.

JOSEPH VILLIERS DENNEY, B. A..................................The Dennison.
Professor of Rhetoric and the English Language.

EDWARD ORTON, Jr., E. M., Secretary.....................The Normandie.
Director of the Department of Clay-Working and Ceramics.

WILLIAM T. MAGRUDER, M. E..
Professor of Mechanical Engineering.

WILLIAM McPHERSON, Jr., D. SC.........................97 Hamilton Avenue.
Professor of Chemistry.

FRANK EDWIN SANBORN, SC. B.......................380 West Eighth Avenue.
Professor and Director of the Department of Industrial Arts.

JOSEPH NELSON BRADFORD, M. E......................54 West Tenth Avenue.
Associate Professor of Drawing.

HENRY CURWEN LORD, B. SC............................401 West Sixth Avenue.
Director of the Emerson McMillen Observatory and Associate Professor of Astronomy.

FRANK ARNOLD RAY, E. M......................................137 King Avenue.
Associate Professor of Mine Engineering.

FRANCIS CARY CALDWELL, B. A., M. E..............380 West Eighth Avenue.
Associate Professor of Experimental Engineering.

EMBURY ASBURY HITCHCOCK, M. E..................380 West Eighth Avenue.
Associate Professor of Electrical Engineering.

GEORGE WASHINGTON McCOARD, M. A..
Associate Professor of Mathematics.

CHARLES WALTER MESLOH, M. A.....Cor. High Street and Eleventh Avenue.
Associate Professor of the Germanic Languages and Literatures.

CHARLES SMITH PROSSER, M. S...
Associate Professor of Historical Geology.

JOHN ADAMS BOWNOCKER, D. SC...
Associate Professor of Inorganic Geology.

JAMES ELSWORTH BOYD, M. SC.............................25 Maynard Avenue.
Assistant Professor of Physics.

CHRISTOPHER ELIAS SHERMAN, C. E..........................770 Oak Street.
Assistant Professor of Civil Engineering.

WILLIAM LUCIUS GRAVES, B. A.........................1313 Forsythe Avenue.
Assistant Professor of Rhetoric.

* CHARLES WILLIAM FOULK, B. A..........................41 Eleventh Avenue.
Assistant Professor of Analytical Chemistry.

THOMAS EWING FRENCH, M. E....................435 East Naughton Street.
Assistant Professor of Drawing.

CHARLES LINCOLN ARNOLD, M. SC....................239 West Tenth Avenue.
Assistant Professor of Mathematics.

CHARLES A. BRUCE, B. A..
Assistant Professor of Romance Languages and Literatures.

WILLIAM EDWARDS HENDERSON, PH. D.......................................
Assistant Professor of Analytical Chemistry.

EDWIN D. SHURTER, A. M...
Assistant Professor of Rhetoric and Public Speaking.

GEORGE H. McKNIGHT, A. M..
Assistant Professor of Rhetoric and English Language.

KARL DALE SWARTZEL, M. SC.........................57 East Eighth Avenue.
Assistant Professor of Mathematics.

† CHARLES WILLIAM WEICK, B. SC...................30 East Ninth Avenue.
Assistant in the Industrial Department and Instructor in Pattern Making and Founding.

WILLIAM ABNER KNIGHT.................................206 West Lane Avenue.
Assistant in the Industrial Department and Instructor in Machine Work.

THOMAS KENYON LEWIS, B. SC.......................68 East Seventh Avenue.
Assistant in Drawing.

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* Absent on leave. † Resigned.

FREDERICK KESTER, M. E. in E. E....................229 West Eleventh Avenue.
Assistant in Physics.

EDWARD EVERETT SOMERMEIER, G. PH............13 West Frambes Avenue.
Assistant in Metallurgy and Mineralogy.

FREDERICK WILLIAM SMYSER, S. B..................312 West Seventh Avenue.
Assistant in the Industrial Department and Instructor in Forging.

FRED ALAN FISH, M. E. in E. E.......................229 West Eleventh Avenue.
Assistant in Electrical Engineering.

JOSEPH HENRY VOSSKUEHLER.......................75 West Eleventh Avenue.
Assistant in Drawing.

....
Assistant in Rhetoric.

SILAS MARTIN ....
Assistant in Drawing.

HORACE JUDD, M. E..22 Woodruff Avenue.
Fellow, and Laboratory Assistant in Mechanical Engineering.

FREDERICK JAMES HALE, M. E..................................212 Tenth Avenue.
Fellow in Mechanical Engineering.

EMMA LEANNA BALL, M. S.......................................225 King Avenue.
Fellow in Mathematics.

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Fellow, and Laboratory Assistant in Industrial Arts.

ALBERT VICTOR BLEININGER. ....
Laboratory Assistant in Ceramics.

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Fellow, and Laboratory Assistant in Chemistry.

JOHN WESLEY YOUNG, B. PH................................886 East Main Street.
Fellow in Mathematics.

ALBERT FREEMAN HALL......................................1051 Highland Street.
Machinist, Department of Mechanical Engineering.

JOHN PATTERSON COVAN..............................500 West Sixth Avenue.
Machinist, Department of Electrical Engineering.

JOHN THOMAS MARTIN, Lieut. 5th Artillery U. S. A.............................
Professor of Military Science and Tactics.

OLIVE BRANCH JONES..53 Eleventh Avenue.
Librarian.

CLARENCE P. LINHART, M. D................................Great Southern Hotel.
Director of the Gymnasium.

COURSES OF STUDY IN THE COLLEGE OF ENGINEERING

In the following pages is given a statement of the general nature and scope oi the various courses of instruction, and the fields of usefulness for which they are believed to constitute an efficient preparation. The courses themselves are given in schedule form, and with reference numbers, by which the exact nature of each subject and something of its method of presentation can be found on consulting the lists of studies given under each Department.

Courses Leading to a Degree

The first year of each of the four year courses leading to a degree is very similar. There are two reasons for this:

First. All engineering education is based on the constant use of the fundamental sciences, Mathematics, Physics, Chemistry and Drawing. Consequently, it naturally happens that the various courses start from a common point, proceed side by side for a time, but specialize and subdivide more and more as they progress towards completion.

Second. It is very commonly the case with young men entering College for a technical education, that their natural aptitude for one line of work or another has not been sufficiently developed to enable them to make a wise or final selection of their course in the University.

To obviate the necessity for this selection immediately on entering the University, and to give the incoming students time to learn something of University methods of instruction and of the scope of the various courses, and to enable their instructors to give sound advice to such students as choose to consult with them on this subject, the first year of each of the Engineering Courses leading to a degree has been made as much like the others as is consistent with the purposes of the course.

In all but one course, the first two terms of the first year are substantially alike; in the third term, three-fourths of the work of the same courses still remains identical, while the remaining fourth is varied to meet the diverging requirements of the succeeding year. Thus it is seen that at least two terms may elapse before the student need announce his choice of work, and even at the beginning of the second year, the courses have diverged so little that any good student can reconsider his selection with but little embarrassment or extra work.

The following table shows the requirements for the first year of each of the four year courses:

Schedule of Studies in First Year of Engineering Courses Leading to a Degree

FIRST TERM.				SECOND TERM.				THIRD TERM.			
SUBJECT.	Department number.	Hours per week.	Courses in which the subject is required.	SUBJECT.	Department number.	Hours per week.	Courses in which the subject is requiaed.	SUBJECT.	Department number.	Hours per week.	Courses in which the subject is required.
Rhetoric.	5	2½	All.	Rhetoric.	5	2½	All.	Rhetoric.	5	2½	All.
Mathematics.	14	5	All.	Mathematics.	14 16	2 3	All. All.	Mathematics.	17	5	All.
Drawing.	1	2	All.	Drawing.	1	2	All	Drawing.	2	3	All.
Chemistry.	7	5	All.	Chemistry.	7	5	All.	Chemistry.	12	5	Chemistry.
								Metallurgy.	2	3	Civil Eng. Mining Eng. Ceramics. Industrial Arts.
Shopwork.	7	3	Industrial Arts.	Shopwork.	8	3	Industrial Arts.	Shopwork.	7 9	4 3	Mechanical Eng. Electric. Eng. Industrial Arts.
Modern Language.	Four hours per week, throughout the year, are required in all courses, except Industrial Arts; in Civil, Mining, Mechanical, and Electrical Engineering, students may elect French (1) or German (1); in Ceramics and Chemistry, German (1) or (4) is required.										
Military Drill.	Three hours per week, throughout the year, are required in all courses. In cases of physical disability, prescription work in the Gymnasium, under charge of the Director of Physical Training is given in lieu of Drill.										

The final selection of the course of study which the student is to undertake should involve much careful and serious consideration on his part and that of his friends and advisors. The similarity of the courses, as shown in their tabulated statements, may operate to confuse rather than to assist in the proper selection.

It should be borne in mind that while each course must include much that is common to other courses, since all of them have been derived by a process of growth from the early forms of engineering, still each is arranged on a primary idea, clearly distinct from any other. In the descriptive matter, given on the page opposite to the schedule of study for each course, this central idea has been made plain. Also the order in which the courses are presented is designed to illustrate roughly their relation to each other or the similarity of their aims.

COURSE IN CIVIL ENGINEERING

The field of the civil engineer comprises two distinct lines, Mensuration and Construction. The former includes all forms of measurement, survey and mapping of the earth's surface, from the broad field of Geography and Geodesy to the local work of the municipal surveyor. In the second field, all forms of construction may legitimately enter, such as railroads, highways, docks and harbors, works for water supply and sewage disposal, bridges, buildings and manufacturing plants.

While in the specialization and subdivision of knowledge which has taken place in recent times, many departments of engineering work have grown into separate professions, Civil Engineering is the parent stem from which all have sprung and its field of operation is still larger and more important than ever before.

Although the range of work done under the supervision of civil engineers is extremely broad, still it depends on the constant use of certain general principles mainly derived from the sciences of mathematics, physics and chemistry.

Mathematics is the foundation of the Course in Civil Engineering and on this science the work of the course is established. Thorough work is given, running through three consecutive years with frequent drill in the application of mathematics to actual working problems. Throughout the third and fourth years of the Course, mathematics is in constant use by the student as the foundation of his technical work.

Physics, chemistry, geology and astronomy are each given an important place in the work of the Course, and thorough work is required throughout.

The technical work embraces instruction in free hand and mechanical drawing, surveying and map-making, steel bridges and buildings, masonry structures, roads, streets, railways, water-supply, sanitary engineering, the testing of structural materials, and the fundamentals of steam and electrical machinery.

The drawing extends practically through the entire four years, beginning with free hand and simple mechanical drawing and ending with complete designs, plans and details of various engineering structures. It is designed to fit men to take responsible positions as draftsmen.

The work in surveying includes three terms' work in the text book and field work on the campus, and two months' work additional during the summer vacations. At the end of the second year, and again at the end of the third year, the surveying classes are taken into camp in a rough country and devote their entire time to surveying. It is expected to fit young men for at once taking charge of field engineering corps.

Two terms' work is required in steel construction, the first being devoted to the computation of stress, and the second to the designing, detailing and drawing of roofs, bridges, buildings, and other framed structures. The practice of the best bridge shops is followed as closely as can be done in college work. The term's work in masonry structures treats of building materials, abutments and piers, retaining walls, dams and masonry arches. Roads, street and railway construction and maintenance are treated at length in text books and lectures. A term is devoted to each of the subjects of water supply and sanitary engineering.

All through the technical work, frequent references are made to engineering periodicals, transactions of engineering societies, and standard works on engineering, found in the University Library, and the students are required to become familiar with them. The lectures and recitations are illustrated by drawings gathered from engineering offices, photographs and stereopticon views when desirable. The city of Columbus and vicinity offers many examples of street, road, railway, bridges and other kinds of engineering, which are visited and reported upon by the classes of this department.

The object sought in all the technical work is to give a thorough training in the theory of the subjects, to show how these are applied in practice and to give as much drill as possible in office and field methods. Students not having a taste for mathematics and drawing are advised not to take this Course.

*See also, pages 41-44.

COURSE IN CIVIL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

*SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Civil Eng'r'ng (1) Surveying.	6.	Civil Eng'r'ng (4) C. E. Drawing.	4.	Civil Eng'r'ng (2) Surveying.	6.
Cadet Service.		Cadet Service.		Cadet Service.	

SUMMER COURSE

Civil Engineering (22) 4 weeks, of 6 days per week. Field work in land and railroad surveying.

THIRD YEAR

Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (7) Strength Materials.	5.
Civil Eng'r'ng (3) Surveying.	4.	Civil Eng'r'ng (5) C. E. Drawing.	3.	Civil Eng'r'ng (7) Bridge Strains.	5.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Mathematics (8) Least Squares.	2.	Civil Eng'r'ng (6) Stereotomy.	4.	Astronomy (2) Mathematical.	4.
Geology (2) General.	5.	Geology (2) General.	5.	Drawing (7) Photography.	2.

SUMMER COURSE

Civil Engineering (23) 4 weeks, of 6 days per week. Field work in railroad and topographical surveying.

FOURTH YEAR

Civil Eng'r'ng (8) Bridge Designing.	5.	Civil Eng'g (16–17) Masonry, Railways.	5.	Civil Eng'r'ng (10) Sanitary Eng'g.	5.
Civil Eng'r'ng (15) Masonry.	5.	Civil Eng'r'ng (18) Water Supply.	5.	Geology (3) Economic.	5.
Elec. Eng'r'ng (6) Lectures.	2.	Elec. Eng'r'ng (6) Lectures.	2.	Elementary Law	4.
Elec. Eng'r'ng (7) Laboratory.	2.	Elec. Eng'r'ng (7) Laboratory.	2.		
Astronomy (2) Mathematical.	4.	Mech. Eng'r'ng (17) Laboratory.	3.	Mech. Eng'r'ng (25) Laboratory.	3.
		Civil Eng'r'ng (14) Testing Laboratory.	2.		

THESIS

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* During the second year, students may elect French (3) 2 hours or German (2) 2 hours or Rhetoric (4) 2 hours, each for the year, in addition to the required work of their course.

COURSE IN MECHANICAL ENGINEERING

Mechanical Engineering deals principally with the generation of power or effective energy from the forces of nature and the utilization of this power through mechanical devices. The fundamental science underlying this profession is physics, especially that part of physics relating to mechanics and heat, though mathematics is the medium by which these physical principles are made applicable to practical problems.

The training given in the course is designed to equip men with such general and technical knowledge, that they can enter at once and with equal ease into positions in any of the numerous subdivisions of mechanical engineering, and adapting themselves to the needs of the situation, can rapidly acquire the experience which is essential to that particular work. And at the same time it must be noted that no one lacking this broad preliminary view of the profession as a whole, can ever expect to attain the highest skill in any one of its specialties.

The technical work of the Course begins with physics, which is taught by a year's text book course, supplemented by two terms of laboratory work. This is followed in turn by mechanics, mechanism, the strength of materials, bridge strains, machine design, thermo-dynamics, prime movers, steam boilers, shop appliances, hydraulic machinery, and the metallurgy of fuel, iron and steel.

The theoretical principles of these subjects cannot be made real and practical to the student except by an extended system of laboratory courses. Three such are provided, in shopwork, drawing and experimental engineering, respectively. The shopwork course trains the student in those handicrafts in constant use in all mechanical industries, viz., forging, chipping and filing, carpentry, pattern-making, foundry work, and the use of the principal metal-working machine tools.

The course in drawing includes free hand drawing, lettering, projection, descriptive geometry, shade shadows and perspective and technical drawing, all leading up to the three terms of machine design which teach the student to use this drawing as one of the important tools of his profession.

The experimental engineering, coming in the last year of the course, gives the student opportunity to gain familiarity with boiler tests, determinations of the efficiency of steam powerplants, gas engines, hydraulic and refrigerating machinery, measurements of friction, losses of power in transmission, and many other important technical problems, and is of the greatest use to the student in enabling him to face practical work with confidence in himself.

*See also pages 70–75.

COURSE IN MECHANICAL ENGINEERING

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

*SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descr. Geometry.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Sound, Light.	3.
Shopwork (11) Forging.	3.	Physics (7) Laboratory.	2.	Physics (7) Laboratory.	3.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Shopwork (3) Foundry.	2.	Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine work.	3.
Cadet Service.		Cadet Service.		Cadet Service.	

THIRD YEAR

Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (7) Strength Materials.	5.
Mech. Eng'r'ng (12) Laboratory.	2.	Mech. Eng'r'ng (3) Mechanism.	5.	Mech. Eng'r'ng (3) Mechanism.	2.
Drawing (5) Technical.	3.	Mech. Eng'r'ng (22) Timber, Masonry.	3.	Industrial Arts (6) Machine Design.	5.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Drawing (7) Photography.	2.
Shopwork (14) Machine Work.	3.	Shopwork (15) Adv. Mach. Work.	4.	Civil Eng'r'ng (19) Bridge Strains.	5.
Mathematics (11) Diff. Equations.	1.				

FOURTH YEAR

Mech. Eng'r'ng (8) Thermodynamics.	5.	Mech. Eng'r'ng (9) Prime Movers.	5.	Mech. Eng'r'ng (10) Steam Boilers.	5.
Mech. Eng'r'ng (13) Laboratory.	4.	Mech. Eng'r'ng (14) Laboratory.	4.	Mech. Eng'r'ng (15) Laboratory.	3.
Mech. Eng'r'ng (18) Machine Design.	5.	Mech. Eng'r'ng (18) Machine Design.	5.	Mech. Eng'r'ng (21) Thesis Work.	5.
Elec. Eng'r'ng (6) Lectures.	2.	Elec. Eng'r'ng (6) Lectures.	2.	Industrial Arts (5) Shop Appliances.	3.
Elec. Eng'r'ng (7) Laboratory.	2.	Elec. Eng'r'ng (7) Laboratory.	2.	Mech. Eng'r'ng (20) Hydraulic Mach.	2.

THESIS

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* During the second year, students may elect French (3) 2 hours or German (2) 2 hours or Rhetoric (4) 2 hours, each for the year, in addition to the required work of their course.

COURSE IN ELECTRICAL ENGINEERING

The object of this course is to give such training as shall enable the graduate to successfully take up practical work in those branches of Mechanical Engineering in which Electricity plays the principal part. In general, the training needed for this purpose is the same as that of the Mechanical Engineer, except that the student need have only a general familiarity with other methods of power generation and utilization, and must, of course, make a very thorough study of the whole subject of Electricity, from the point of view of the Physicist as well as that of the Mechanic.

Consequently, the first two years of the two Courses are alike, except that the mechanical training in shopwork in the one is partially replaced by more extended work in applied physics in the other.

A considerable part of the third year is occupied by a thorough training in elementary Electrical Engineering Measurements, such as currents, voltage, capacity, inductance, magnetic flux, etc. This work is given in the Physical Department (see Physics, Course 6, page 84.) The third year also includes training in Mechanics, Mechanism, Machine Design and Mechanical Laboratory. Work in the drawing room and shops continue during this year.

In the fourth year, with the exception of five hours a week through the year given to steam engineering, the time is devoted to the study of dynamo machinery and the other apparatus of applied electricity, with its installlation, testing, operation, etc. This is done by co-ordinate work in the class-room, laboratory and drawing room. The end which is kept most in view, is the training of the student to think for himself, and to solve for himself the problems which form so large a part of the work of the practical engineer.

Work in the class-room is done partly by text book and partly by lecture and recitation, preference being given to the former, where satisfactory books are available. The work is illustrated by the use of the projection lantern, diagrams and illustrative apparatus. Much stress is laid on the solution of numerical problems by the student. In the drawing room, designs are made of dynamo machinery of different kinds, transformers, house wiring, transmission, etc., the work here being as far as practicable based on the theoretical conclusions reached in the class-room and laboratory. The laboratory equipment is excellent and is receiving important accessions from time to time.

*See also pages 55–58.

COURSE IN ELECTRICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

*SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descrip. Geometry.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (11) Forging.	2.	Physics (5) Laboratory.	4.	Physics (5) Laboratory.	4.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Shopwork (4) Chipping, Filing.	2.				
Cadet Service.		Cadet Service.		Cadet Service.	

THIRD YEAR

Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (7) Strength Materials.	5.
Physics (6) Laboratory.	3.	Physics (6) Laboratory.	5.	Physics (6) Laboratory.	5.
Physics (4) Elect'y, Magnetism.	3.	Mech. Eng'r'ng (3) Mechanism.	5.	Mech. Eng'r'ng (16) Laboratory.	4.
Shopwork (13) Machine work.	3.	Shopwork (14) Machine work.	3.	Industrial Arts (6) Machine Design.	5.
Drawing (5) Technical.	3.				
Mathematics (11) Diff. Equations.	1.				

FOURTH YEAR

Elec. Eng'r'ng (2) Elec. Machinery.	5.	Elec. Eng'r'ng (2) Elec. Machinery.	5.	Elec. Eng'r'ng (2) Elec. Machinery.	5.
Elec. Eng'r'ng (3) Design'g, Drawing.	3.	Elec. Eng'r'ng (3) Design'g, Drawing.	3.	Elec. Eng'r'ng (3) Design'g, Drawing.	3.
Elec. Eng'r'ng (4) Laboratory.	5.	Elec. Eng'r'ng (4) Laboratory, Thesis.	5.	Elec. Eng'r'ng (4) Laboratory, Thesis.	5.
Mech. Eng'r'ng (8) Thermodynamics.	5.	Mech. Eng'r'ng (9) Prime Movers.	5.	Mech. Eng'r'ng (10) Steam Boilers.	5.

THESIS

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* During the second year, students may elect French (3) 2 hours or German (2) 2 hours or Rhetoric (4) 2 hours, each for the year, in addition to the required work of their course.

COURSE IN MINING ENGINEERING

The Profession of Mining Engineering is peculiar in the wide range of work it covers. It involves two distinct fields: that of the engineer, presented in the locating, exploiting and operating of mining properties, and that of the chemist and metallurgist in the reduction of ores and the treatment of fuels, as in coke manufacture. A man may devote himself largely to either of these departments, but a competent understanding of both is essential to the successful designing and development of mining or metallurgical plants.

The Course preparatory to such a profession must be a broad one, including a thorough training in general science, especially chemistry, mathematics, mineralogy and geology, as well as in the use of English and, as far as possible, foreign languages.

With this as a foundation there must be given special instruction in the arts which are related particularly to mining and metallurgy, and which usually furnish the first employment to the graduate, such as drafting, surveying, technical chemical analysis and assaying. Experience has shown that these subjects can be so taught in College as to enable a man to be of use in the industry during the time in which he is acquiring that experience and judgment which are essential to his ultimate success.

Finally the advanced work of the profession must be fully treated. Such work naturally occupies the later years of the Course, being necessarily proceeded by the mathematics and the general science training. The Course which follows has been framed on these general principles.

The third year is largely devoted to special professional studies. The work in Metallurgy is extended and developed in special lectures on the metals, their properties and reduction, fuel, furnaces, refractory materials and the principles of slag formation and furnace charging. Fire assaying of gold, lead and silver ores is taught practically.

The engineering side of the course is developed in this year by training in the principles of construction, as given in mechanics, strength of materials and bridge strains. Surveying is taught by lectures, recitations and extended field practice.

In the fourth year of the Course the problems of mine engineering and metallurgical construction are developed in lectures covering the theory and practice of mine development and operation, furnace construction and design, etc., and are supplemented by practical work in the drafting room and by visits to accessible mines and metallurgical works for study and comparison.

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*See also pages 76–82.

COURSE IN MINING ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

*SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Metallurgy (5) Laboratory	5.	Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.
Shopwork (7) Woodwork.	2.	Shopwork (11) Forging.	2.	Shopwork (4) Chipping, Filing.	2.
Cadet Service.		Cadet Service.		Cadet Service.	

THIRD YEAR

Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (7) Strength Materials.	5.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) General.	5.	Metallurgy (3) Deter. Mineralogy.	5.
Mine Eng'r'ng (4) Mine Surveying.	5.	Metallurgy (6) Assaying.	5.	Civil Eng'r'ng (19) Bridge Strains.	5.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.

FOURTH YEAR

Mine Eng'r'ng (5) Mine Engineering.	5.	Mine Eng'r'ng (5) Mine Engineering.	5.	Mine Eng'r'ng (5) Mine Engineering.	5.
Geology (2) General.	5.	Geology (2) General.	5.	Geology (3) Economic.	5.
Metallurgy (8) Ore Dressing.	2.	Metallurgy (7) Metal. Const'tion.	3.	Mine Eng'r'ng (6) Plans, Specif'tions.	5.
Elec. Eng'r'ng (6) Lecture.	2.	Elec. Eng'r'ng (6) Lectures.	2.	Drawing (7) Photography.	2.
Elec. Eng'r'ng (7) Laboratory.	2.	Elec. Eng'r'ng (7) Laboratory.	2.		

THESIS

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* During the second year, students may elect French (3) 2 hours or German (2) 2 hours or Rhetoric (4) 2 hours, each for the year, in addition to the required work of their course.

COURSE IN CERAMICS

The Ceramic Industries include, according to the classification here adopted, those industries in which the production and utilization of natural and artificial silicates is the end in view, viz., claywares, glass and cement. These three industries constitute a natural division of chemical technology, and though they are intimately connected with the field of the metallurgist on the one hand and with the manufacturing chemist on the other, still they have an individuality which necessitates their study and exploitation as a separate field of industrial science.

The work which the ceramic engineer must be prepared to supervise is broad and varied. In the preparation of any product of uniform physical and chemical qualities from the crude rocks and minerals of the earth's surface, a knowledge of chemistry is the foremost essential, and no one without the training of the chemical laboratory ,in which an account must be rendered for everything, can hope to attain the highest mastery in this subject. In this course, therefore, chemistry forms an important part of the training, beginning with the first term and continuing through three years of purely chemical work, followed by a year of practice in the application of chemistry to ceramic operations.

But the ceramic engineer will be subjected to other calls on his resources. He must be able to intelligently search for and locate deposits of the crude mineral supplies which he needs, and having found them, he must be able to win them safely and economically, whether on the surface or under ground in mines. To this end, the student is given training in mineralogy, geology, both historic and economic, metallurgy, so far as it pertains to fuels and iron, and mine engineering.

Also, like the metallurgist, the ceramist deals with reagents and performs chemical reactions on a gigantic scale; and in the winning of the materials, their mechanical preparation, their economic handling and storage, their manufacture into useful forms, and in the construction of buildings, machinery, kilns and furnaces for these purposes, the knowledge and resources of the trained engineer must constantly re-enforce those of the chemist and geologist. Accordingly the course includes a vigorous drill in mathematics, physics, mechanics, strength of materials, drawing, drafting, shopwork and construction. In addition, at least one year of German and two years in the correct use of the English language are required.

*See also pages 45-49.

COURSE IN CERAMICS

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

*SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Ceramics (1) Laboratory.	5.	Ceramics (2) Laboratory.	5.	Ceramics (3) Laboratory.	5.
Shopwork (7) Woodwork.	2.	Shopwork (11) Forging.	2.	Shopwork (4) Chipping, Filing.	2.
Cadet Service.		Cadet Service.		Cadet Service.	

THIRD YEAR

Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (6) Mechanics.	5.	Mech. Eng'r'ng (7) Strength Materials	5.
Ceramics (4) General Principles.	5.	Ceramics (5) Bricks.	5.	Ceramics (6) Pottery.	5.
Mine Eng'r'ng (4) Mine Surveying.	5.	Ceramics (7) Adv. Chem. Lab.	5.	Ceramics (8) Adv. Chem. Lab.	5.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.

FOURTH YEAR

Ceramics (9) Manf. of Bodies.	5.	Ceramics (10) Glasses and Glazes.	5.	Ceramics (11) Enamels, Colors.	5.
Geology (2) General.	5.	Ceramics (12) Cement.	5.	Geology (3) Economic.	5.
Metallurgy (4) Fuels and Iron.	5.	Ceramics (14) Reports.	5.	Ceramics (15) Thesis Work.	5.
Drawing (7) Photography.	2.	Ceramics (13) Ceramic Const.	2.		

THESIS

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* During the second year, students may elect French (3) 2 hours or German (2) 2 hours or Rhetoric (4) 2 hours, each for the year, in addition to the required work of their course.

COURSE IN CHEMISTRY

This Course has been prepared to meet the growing demand for trained men in the numerous manufacturing industries which are based upon chemical processes or employ them prominently in their work, and which are not included in the fields of Metallurgy and Ceramics. Among such may be mentioned the manufacture of acids, alkalies, salts, chemical reagents, paints, colors, dyes, bleaching powders, soaps, glue, gelatine, glycerine, tanning compounds, starch, sugar, dextrine and glucose, alcohol, ferments, preservatives, antiseptics, fertilizers, pyrotechnics, matches and many others.

In order to meet the demands of such widely diversified industries, it is necessary that the training offered shall be somewhat elastic and permit the student of specialize somewhat in advance of his graduation.

The work of the course is therefore partly required and partly elective.

The compulsory work is planned to meet two requirements: 1st, a thorough knowledge and grasp of the science of Chemistry; and 2d, sufficient general training in Engineering to enable the student to plan the execution of chemical work on a large scale, and with the mechanical aids necessary to commercial success.

The student begins his chemical work in the first year with general inorganic chemistry, followed by qualitative and quantitative analysis, metallurgical analysis, organic chemistry, inorganic preparations or the elements of manufacturing chemistry, sanitary analysis, advanced theoretical chemistry and a course of lectures on general applied chemistry, including a term each in the elements of metallurgy and ceramics.

In the Engineering side, the requirements include mathematics, physics, drawing and shopwork. Besides the usual training in English, German also is compulsory on account of the large amount of chemical literature printed only in this language.

In the elective work opportunity is given to the student, under superivsion of the head of the department, to frame his course according to the ultimate use to which he intends to put it. These electives begin in the second year and increase in amount as the student becomes more mature and better able to guage his purposes and abilities. In ordinary cases, where the student is fitting himself for some branch of chemical technology, he should elect further work in Engineering, such as advanced mathematics, drafting, mechanics, strength of materials, machine design, thermo-dynamics, steam engineering, or applied electricity.

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*See also pages 38-40.

COURSE IN CHEMISTRY

Note — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

*SECOND YEAR

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Chemistry (4) Quantitative.	5.	Chemistry (4) Quantitative.	5.	Chemistry (4) Quantitative.	5.
German (2) Scientific Reading.	2.	German (2) Scientific Reading.	2.	German (2) Scientific Reading.	2.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Sound, Light.	3.
Shopwork (7) Woodwork.	3.	Shopwork (11) Forging.	3.	Metallurgy (2) Mineralogy.	3.
Cadet Service.		Cadet Service.		Cadet Service.	

Electives three to five hours throughout the year.

The following are suggested: Mathematics (18, 19, 20), 5 hours; Drawing (3), 3 hours; Physiology (3), 3 hours; History (5), 4 hours; Economics (1), 4 hours.

THIRD YEAR

Chemistry (8) Organic.	5.	Chemistry (9) Organic.	5.	Chemistry (9) Organic.	5.
Metallurgy (5) Laboratory.	5.	Metallurgy (6) Assaying.	5.	Metallurgy (5) Laboratory.	5.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.

Electives five to eight hours throughout the year.

The following are suggested: Physical Laboratory, 3 to 5 hours, Geology, 5 hours—or Geology and Determinative Mineralogy, 5 hours; Shopwork, 3 hours.

FOURTH YEAR

Chemistry (17) Inorganic Prep.	4.	Chemistry (14) Theoretical.	3.	Chemistry (15) Sanitary.	4.
Metallurgy (4) Fuels and Iron.	5.	Chemistry (16) Applied.	3.	Ceramics (16) Applied.	3.
		Physiology (8) Bacteriology.	2.		

Electives to make the total work equal sixteen or eighteen hours, including Thesis work.

Students in Metallurgical Chemistry will take Ore Dressing the first term, and Metallurgy (4) 5, through the second term. For such students Chemistry (14, 15, 16) and Physiology (8) will not be compulsory.

THESIS

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* During the second year, students may elect French (3) 2 hours or German (2) 2 hours or Rhetoric (4) 2 hours, each for the year, in addition to the required work of their course.

COURSE IN INDUSTRIAL ARTS

This course is designed for those wishing to become teachers of Manual Training and for those intending to enter the various branches of manufacture and industry, not as engineers, but as practical managers, superintendents, or business men.

It is composed of required and elective work. The required work of the course combines with a general science training, a large amount of drawing and shopwork, in which the underlying principles and methods employed in the various branches of industry are especially dwelt upon. The elective work allows the student large liberty of action. There is open to him any course, for which he has the necessary fitting, in any College, except Law.

One student desiring to become a teacher or director of Manual Training in the public schools or elsewhere will naturally elect many studies in the educational line, as psychology, history of education, pedagogy, etc., thus obtaining a deeper insight into the principles of his profession and a broader understanding of its methods and purposes.

Another wishing to become a manager, superintendent, or business man in manufacturing lines will find many subjects from which to make selection, taking as taste or plans may determine, studies in engineering, sciences, economics, etc. Thus this election wisely made, will equip one for a wide range of occupations. The course is educational as well as professional in its aims, and trains the hand and mind together.

This course is also adopted to those bright young men who, having already entered upon industrial pursuits at machine or bench, have risen to a certain point, and find their way barred at this point by the lack of a better education. This course is intended to appeal strongly to such and to furnish an opportunity to get the needed training. With such training they will be able to go forward to positions of greater responsibility. Those who feel unable to spend four years in this work will find in the short course (page 34) much of value to them.

In all of this work it is expected that the election of studies by the student will be made in consultation with the head of the Department.

*See also pages 62–68.

COURSE IN INDUSTRIAL ARTS

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

*SECOND YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Sound, Light.	3.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Advanced Forging.	3.
Cadet Service.		Cadet. Service.		Cadet. Service.	

Electives, six to eight hours—any work upon which the student is qualified to enter, in any College except the College of Law.

THIRD YEAR

Drawing (5) Technical.	3.	Industrial Arts (2) Tech. Drawing.	3.	Industrial Arts (2) Tech. Drawing.	3.
Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.
Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.

Electives, eight to ten hours—any work upon which the student is qualified to enter, in any College except the College of Law.

FOURTH YEAR

Industrial Arts (3) Shop Equipment.	3.	Industrial Arts (3) Shop Appliances.	3.	Industrial Arts (3) Shop Management.	3.
Industrial Arts (4) Tech. Drawing.	3.	Industrial Arts (4) Tech. Drawing.	3.	Industrial Arts (4) Tech. Drawing.	3.
Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Shopwork (17) Adv. Mach. Work.	3.

Electives, eight to ten hours—any work upon which the student is qualified to enter, in any College except the College of Law.

THESIS

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* During the second year, students may elect French (3) 2 hours or German (2) 2 hours or Rhetoric (4) 2 hours, each for the year, in addition to the required work of their course.

Courses not Leading to a Degree

The following short courses are offered by the University, in the belief that they will meet the needs of a large class of young men who for any reason will not or cannot obtain the benefits of the thorough courses already described. The University recognizes that there are many valid reasons which may stand in the way of young men, whose ability to receive and use the highest forms of education is without question, and it is thought that in extending opportunities for such training as will be available to such young men, the University is filling a longfelt want in the scheme of engineering education and is certain to grow into closer contact with the industrial life of the State.

To those who complete these courses no diploma is given, but a certificate is issued stating the list of studies which the student has taken in his course, and in which his work has been satisfactory.

THREE-YEAR COURSE IN ARCHITECTURE

This course was established in 1896, to meet a growing demand for special training along this line. The extremely rapid developments, in late years, of novel methods of construction, the constantly extending list of materials used, and the creation of types of buildings entirely without precedent in the history of architecture, render it not only desirable, but imperative, that a large class of young men shall be brought forward who unite with the necessary training in form and color, orders and styles, and the history of architecture, the engineering training which will enable them to build safe, durable, healthful structures.

The employment in architecture of so many young men trained in other branches of engineering seems to prove the urgent need of those whose training is directed expressly to this end.

The course offered gives a good elementary training in mathematics, physics and mechanics, which are fundamental, together with a thorough drill in drawing, designing, shopwork, and the more technical branches of architecture proper.

*See also pages 50–53.

COURSE IN ARCHITECTURE

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Rhetoric (5) Paragraph Writing.	2½.	Rhetoric (5) Theme Writing.	2½.	Rhetoric (5) Prose Analysis.	2½.
Mathematics (14) Trigonometry.	5.	Math. (15–16) Trig., Algebra.	2, 3.	Mathematics (17) Plane Analytics.	5.
Drawing (1) Freehand.	3.	Drawing (1) Freehand.	3.	Drawing (1) Water Color.	3.
Chemistry (7) Inorganic.	5.	Chemistry (7) Inorganic.	5.	Drawing (2) Lettering.	3.
Shopwork (7) Pattern Making.	3.	Shopwork (8) Cabinet Work.	3.	Shopwork (10) Carp'try: Building.	3.
Cadet Service.		Cadet Service.		Cadet Service.	

SECOND YEAR

Drawing (7) Photography.	2.	Architecture (1) Orders.	5.	Architecture (2) Styles.	5.
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	5.
Drawing (14) Pen.	2.	Drawing (12) Clay Modelling.	2.	Drawing (12) Clay Modelling.	2.
Greek (1) Ancient Art.	2.	Greek (1) Ancient Art.	2.	Greek (1) Ancient Art.	2.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Mech. Eng'r'ng (23) Mater. of Construct.	5.				
Cadet Service.		Cadet Service.		Cadet Service.	

THIRD YEAR

Architecture (3) Designing.	5.	Architecture (3) Designing.	5.	Architecture (3) Designing.	5.
Architecture (4) Specifications.	2.	Architecture (5) Decorations.	3.	Architecture (6) Estimates.	4.
Civil Eng'r'ng (15) Masonry.	5.	Architecture (7) Heating.	5.	Architecture (8) Designing.	5.
Civil Eng'r'ng (20) Roof Trusses.	5.	Civil Eng'r'ng (6) Stereotomy.	4.	Civil Eng'r'ng (21) Surveying.	3.

SHORT COURSE IN MINING

The Short Course in Mining is especially designed for young men who have had a practical experience in mines, and wish to study mine surveying, drafting, the problems of ventilation, drainage, haulage, mine operating, etc., and also something of the sciences bearing upon their work, but have neither the time nor the preparation for a full college course. The first year is devoted to a thorough study of the elementary mathematics and sciences necessary to prepare the student for the practical work of the second year. The experience of the past eight years has shown beyond any doubt that any enterprising young miner can master the subject sufficiently well in the time assigned to materially increase his earning capacity and chances for promotion in his occupation.

Personal instruction is given, and it is made thoroughly practical and of such a character as to best adapt it to the needs of the individual student.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Geometry.	5.	Mathematics (13) Geometry.	5.	Mathematics (14) Trigonometry.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Cadet Service.		Cadet Service.		Cadet Service.	

SECOND YEAR

Drawing (1) Freehand.	2.	Drawing (4) Draughting.	3.	Drawing (2) Lettering.	2.
Drawing (3) Projections.	3.	Geology (4) Elementary.	5.	Metallurgy (9) Mineral Chemistry.	5.
Chemistry (7) Inorganic.	5.	Chemistry (13) Laboratory.	3.	Shopwork (11) Forging.	3.
Mine Eng'r'ng (1) Mine Surveying.	5.	Mine Eng'r'ng (2) Ventilat., Haulage.	5.	Mine Eng'r'ng (3) Mine Operating.	5.
Cadet Service.		Cadet Service.		Cadet Service.	

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*See also pages 76–82.

SHORT COURSE IN CLAY-WORKING

The two-year or Industrial Course is designed to assist young men who have already been actively engaged in the Ceramic industries, and who, on account of mature years, or lack of means, or lack of previous educational advantages, are unable to avail themselves of the full and complete course, and yet who wish to increase their earning power or chances of promotion by fitting themselves for other than routine labor. The requirements for admission to this course are very low, and the work required throughout is much less severe than that of the four-year course; in fact, anyone who is willing to really apply himself, can retain his membership in this class, but there is no place for any but those who are thoroughly in earnest, and poor work will not be accepted from those who are able to do good work.

In short in this Industrial Course, the department recognizes its closest medium of communication with the wants of the clay industries, and it is intended to so maintain this course as always to render the greatest good to the greatest number.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM	Credit hours	SECOND TERM	Credit hours	THIRD TERM	Credit hours
Chemistry (7) Inorganic.	5.	Chemistry (7) Inorganic.	5.	Chemistry (12) Analytical.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Mathematics (1) Algebra.	5.	Mathematics (3*a*) Geometry.	5.	Shopwork (11) Forging.	3.
				Shopwork (4) Chipping, Filing.	2.
Cadet Service.		Cadet Service.		Cadet Service.	

SECOND YEAR

Ceramics (1) Chem. Analysis.	5.	Ceramics (2) Analysis of Clays.	5.	Ceramics (3) Analysis of Glazes.	5.
Ceramics (4) Gen. Principles.	5.	Ceramics (5) 'Brick.	5.	Ceramics (6) Pottery.	5.
Geology (2) General.	5.	Drawing (11) Mechanical.	5.	Geology (3) Economic.	5.
Cadet Service.		Cadet Service.		Cadet Service.	

*See also pages 45–49.

SHORT COURSE IN INDUSTRIAL ARTS

This course is primarily designed to extend the benefits of the same kind of training as that given in the four-year course in this subject to that class of young men who may be unable for any reason to undertake a course of four years' duration, but who aspire to become actively engaged in factory work. It has been the aim to give, in as condensed a form as possible, those studies which will most rapidly and easily be turned to practical account in manufacturing operations; such as drawing, shopwork, use of machine tools, etc., together with a grounding in the physics and mathematics which underlie these operations.

The course will be found most valuable to young men already engaged in factory work, who find themselves limited from rising in their work on account of lack of technical education.

Note — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

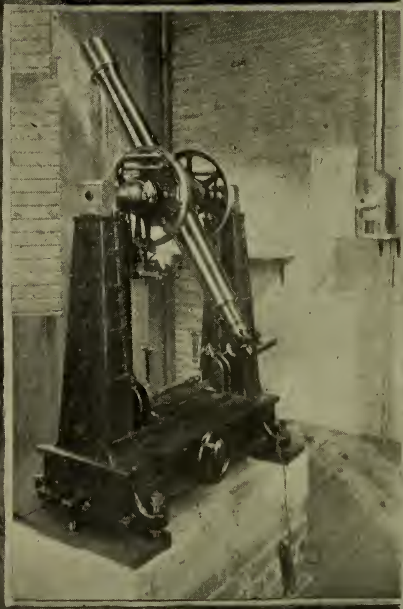
First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.
Drawing (8) Geometric.	2.	Drawing (8) Projections.	2.	Drawing (2) Lettering.	2.
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Plane Geometry.	5.	Mathematics (13) Space Geometry.	5.	Mathematics (14) Trigonometry.	5.
Shopwork (7) Pattern Making.	3.	Shopwork (8) Cabinet Work.	3.	Shopwork (11) Forging.	3.
Cadet Service.		Cadet Service.		Cadet Service.	

SECOND YEAR

Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Shopwork (3–4) Foundry, Filing.	5.	Shopwork (13) Machine Work.	5.	Shopwork (15) Adv. Mach. Work.	5.
Cadet Service.		Cadet Service.		Cadet Service.	

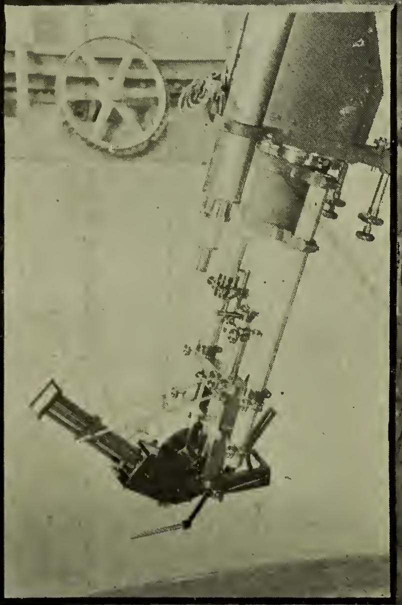
*See also pages 60–66.

GYMNASIUM



TRANSIT

12 INCH TELESCOPE



SPECTROSCOPE

DEPARTMENTS OFFERING INSTRUCTION IN THE COURSES OF THE COLLEGE OF ENGINEERING—DESCRIPTION OF EQUIPMENT AND CLASSES.

ASTRONOMY

Professor H. C. Lord

The importance of a practical knowledge of the methods of astronomical observation to Civil Engineers made the establishment of the Emerson McMillin Observatory a very important advantage to the College of Engineering. The instructions given to the Engineering students includes the use of this fine equipment in practical work under the immediate supervision of the Director.

The building and its equipment is the gift of Mr. Emerson McMillin, of Columbus, Ohio, and was built during the summer of 1895. The first floor is divided by a hall and stairway into two parts. The east wing contains an office, library, clock room and a large, well lighted room for the students, furnished with tables, where they reduce their observations and keep the records of their work. The west wing contains the transit house, the dome and photographic dark room. The transit house is a light frame structure, so designed as to be kept as free as possible from heat radiated by any heavy wall of masonry. The dome is a wooden framework covered on the outside with canvas.

The equipment consists of a twelve-inch equatorial telescope, mounting by Messrs. Warner & Swasey, objective by Mr. Brashear, with a large and powerful spectroscope by Mr. Brashear. This instrument is adapted to use either one or two prisms or a grating, and is provided with a double set of objectives, one corrected for the visual and one for the photographic rays; a position micrometer with a seven-inch circle by Messrs Warner & Swasey; a combined zenith telescope and transit instrument of three inches clear aperture by Mr. G. N. Saegmuller; a sidereal clock by Clemens Riefler, of Munich; a comparater by Carl Ziliss; a four-inch portable equatorial by Alvan Clark; a chronograph by Warner & Swasey; sextants, chronometers, meteorological instruments, etc. There is also provided a spectroscopic laboratory, equipped with a Brashear concave grating spectroscope, a two-horse power gas engine and dynamo, a storage battery, a large induction coil. In addition to the above, Mr. McMillin's gift provides for an excellent astronomical library.

2. **Astronomy and Geodosy.** Lectures on practical Astronomy, supplemented by practice with the instruments of the Emerson McMillin Observatory. Text-book, Doolittle. Four times a week. (Third Term of third year and First Term of fourth year of Course in Civil Engineering.)

CHEMISTRY

Professor McPherson, Professor Norton, Assistant Professor Henderson, Mr. Kohr

The laboratories of the Department accommodate three hundred and eighty-five students. The general lecture room is large and well lighted, and all needed facilities are provided for the full experimental illustration of the lecture courses. The Department is supplied with the best apparatus and materials for both lecture and laboratory work, and has also a growing collection of specimens illustrating the application of chemistry to the arts.

Chemical Hall is occupied by the Departments of Chemistry, Mining, Metallurgy, and Pharmacy. The buildings and contents have cost about sixty-two thousand dollars. It is two stories in height, with a basement. It is built of pressed brick laid in red mortar. At the entrance is a large loggia, and beyond this is a vestibule opening into the main hall.

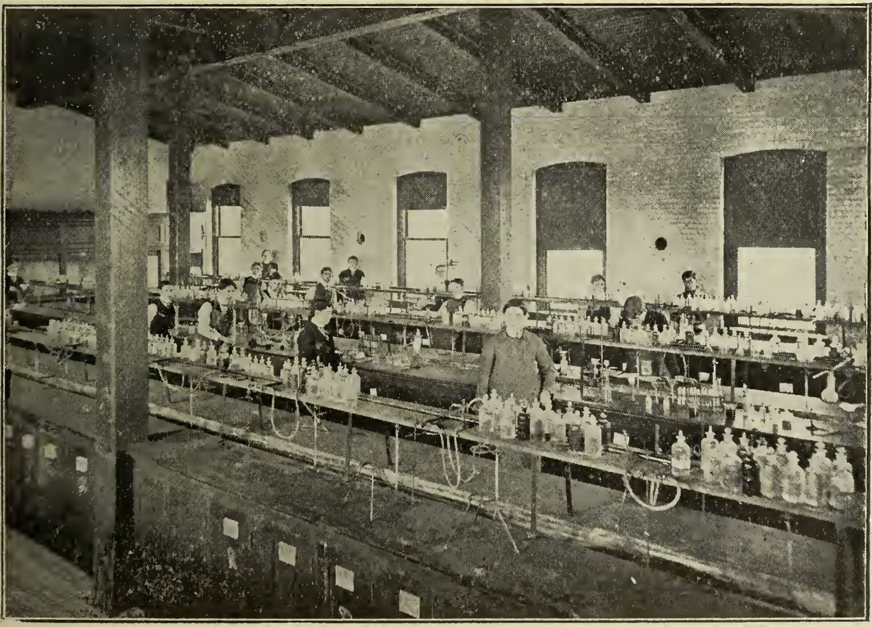
The Department of Chemistry occupies the middle and western portion of the second floor and the middle portion of the first floor. The main lecture room has a seating capacity of one hundred and fifty persons. The laboratory of elementary chemistry accommodates three hundred students. The qualitative laboratory contains desks for twenty students. The quantitative laboratory, on the first floor, is the same size as the laboratory of elementary chemistry, and has accommodations for fifty students. Besides these, there is a laboratory for organic chemistry, with desks for fifteen students, a room for combustions, a room for the preparation of experiments, a balance room, a room for working with foul gases, one for spectroscopic work, one for rough work, one for books, three private laboratories and an office.

7. **Elementary Chemistry.** Inorganic. Lecture, Laboratory and Quiz. Laboratory work; First Term, experiments upon the non-metals; Second Term, principles of qualitative analysis. Five times a week. (Required in First and Second Terms of first year in all four-year Engineering Courses and in Short Course in Clay-working, and in First Term, first year, of Short Course in Mining.)

12. **Qualitative Analysis.** Five times a week. (Required in Third Term, first year, Course in Chemistry, and Short Course in Clay-working.)

13. **Qualitative Analysis.** Three laboratory periods a week. (Required in Second Term, second year, Short Course in Mining Engineering.)

CHEMICAL LECTURE ROOM



QUALITATIVE LABORATORY

4. **Quantitative Analysis.** Laboratory, lectures and recitations. Use of the balance and general principles of gravimetric analysis. Drill in the solution of problems in quantitative analysis; study of properties of precipitates; principles of volumetric analysis. Selections are made from such analytical methods as best meet the needs of the students. The samples used for analysis are mixtures or commercial products, the percentage composition of which is not made known to the student until he has reported his own results. Five times a week. (Required throughout second year Course in Chemistry.)

8. **Organic Chemistry.** Lectures. Five times a week. (Required in First Term, third year Course in Chemistry.)

9. **Organic Chemistry.** Laboratory. Five times a week. (Required in Second and Third Terms of third year Course in Chemistry.)

14. **Theoretical Chemistry.** Lectures and recitations. Three times a week. (Required in Second Term of fourth year Course in Chemistry.)

15. **Sanitary Analysis.** Laboratory and lectures. A study of the most important chemical methods for the analysis of water and air. Four times a week. (Required in Third Term of fourth year of Course in Chemistry.)

16. **Applied Chemistry.** Lectures on Industrial Chemistry. These are made as practical as possible by visits to different chemical works. When possible specialists deliver lectures on subjects belonging to their particular line of work. Three times a week. (Required in Second and Third Terms of fourth year of Course in Chemistry.)

17. **Inorganic Preparations.** Four times a week. (Required in First Term of fourth year of Course in Chemistry.)

For courses in the technical analysis of iron, steel and allied products, see the Department of Mining and Metallurgy.

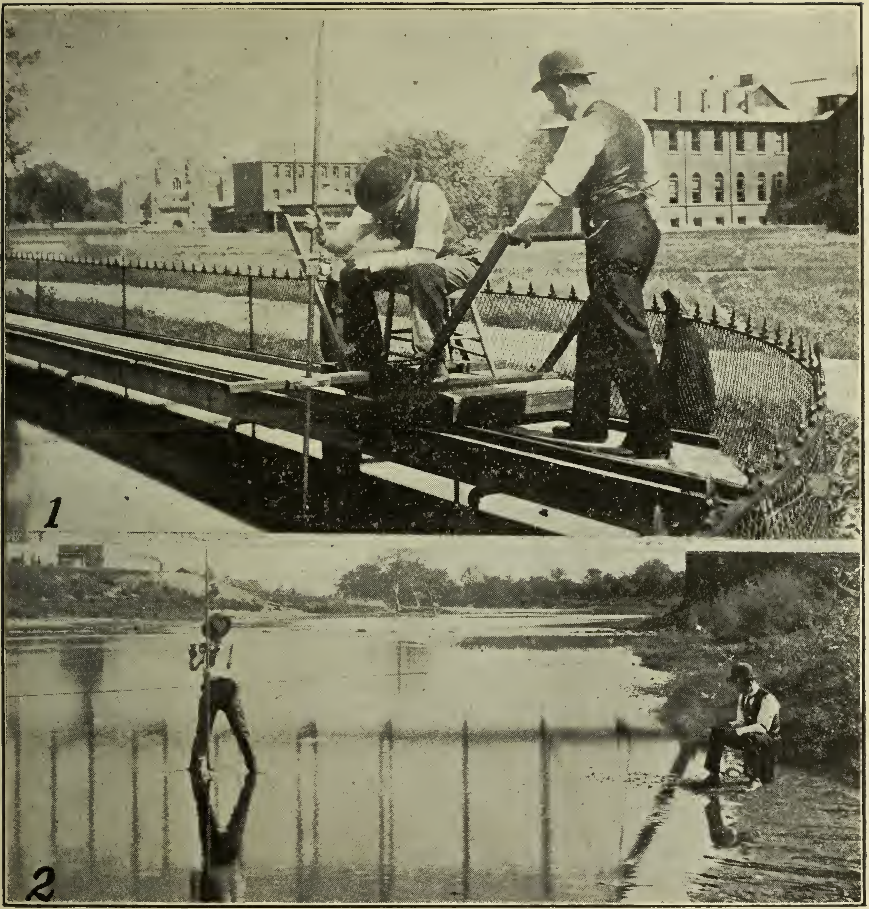
CLASS IN SURVEYING

CIVIL ENGINEERING

Professor Brown, Assistant Professor Sherman

The facilities provided for the illustration of and practical training in the Courses in Civil Engineering are as follows: One high grade and three ordinary transits, three leveling instruments, solar compass, prismatic compass, improved telescope compass, Abney hand level, level and stadia rods, sight poles, chains, tapes; twenty-six improved drawing tables with 30″ by 36″ top; Schroeder's models in stereotomy and roof trusses; large set of models of wooden joints; collection of photographs of bridges both when finished and in course of erection; collections of strain sheets and shop drawings of bridges, new improved cement testing machine and outfit for making all kinds of cement tests; stone mason's tools for working models out of plaster blocks; magic lantern and slides; calculating machines; sets of drawing instruments; blue-print room with outfit; set of tracings of standard structures from which each student makes a set of blue-prints. The equipment is growing each year by the addition of materials purchased, presented, or made by students of the Department.

1. **Land Surveying.** Recitations and field work. Johnson's Theory and Practice of Surveying. Six times a week. (First Term of second year of Course in Civil Engineering.)
2. **Railroad Surveying.** Recitations and field work. Searle's Field Engineering. Six times a week. (Third Term of second year of Course in Civil Engineering.)
3. **Topographical Surveying.** Lectures, field work and drawing. Johnson's Surveying used for reference. Four times a week. (First Term of third year of Course in Civil Engineering.)
4. **Topography.** Platting, pen and tinted work. Reed's Topographical Drawing and Sketching. Four times a week. (Second Term of second year of Course in Civil Engineering.)
5. **Working Drawings in Railway Construction.** Lectures and drawing and estimates of simple structures. Three times a week. (Second Term of third year of Course in Civil Engineering.)
6. **Stereotomy.** Recitations, drawing and model cutting. Warner's Stereotomy. Four times a week. (Second Term of third year of Course in Civil Engineering and Architecture.)
7. **Bridge Strains.** Recitations and lectures. Part I of Dubois's Strains in Framed Structures. Five times a week. (Third Term of third year of Course in Civil Engineering.)
8. **Bridge Designing.** Lectures and drawing. Part II of Dubois's Strains in Framed Structures and Johnson's Modern Framed Structures used for reference. Five times a week. (First Term of fourth year of Course in Civil Engineering.)



1 — MEASURING VELOCITY OF CURRENTS

2 — MAKING CROSS SECTION OF RIVER-BED

10. **Sanitary Engineering.** Lectures. Five times a week. (Third Term of fourth year of Course in Civil Engineering.)

14. **Civil Engineering Laboratory.** Cement testing, adjustment of instruments. Twice a week. (Second Term of fourth year of Course in Civil Engineering.)

15. **Masonry Construction.** Recitations and lectures. Baker's Masonry Construction. Five times a week. (First Term of fourth year of Course in Civil Engineering, and First Term of third year of Course in Architecture.)

16. **Highways.** Lectures on roads, streets, canals, railroads and rivers. Five times a week. (Second Term of fourth year of Course in Civil Engineering.)

    Fourth year students in Civil Engineering must elect either 16 or 17.

17. **Railway Location.** Recitations and lectures. Wellington's Economic Theory of Railway Location. Fives times a week. (Second Term of fourth year of Course in Civil Engineering.)

    Fourth year students in Civil Engineering must elect either 16 or 17.

18. **Water Supply.** Recitations and lectures. Fanning's Water Supply. Five times a week. (Second Term of Fourth year of Course in Civil Engineering.)

19. **Trusses.** Lectures and drawing. Five times a week. (Third Term of third year of Courses in Mining Engineering and Mechanical Engineering.)

20. **Roof Trusses.** Lectures and drawing. Five times a week. (First Term of third year of Course in Architecture.)

21. **Surveying.** Recitations and field work. Davies' Surveying. Three times a week. (Third Term of third year of Course in Architecture.)

22. **Summer Course in Field Work.** The students are taken into camp in a rough, broken country and given a thorough drill in land and elementary railroad surveying. The course begins directly after commencement day, and continues four weeks of six days per week, ten hours per day. The work of the student and the discipline of the camp is in the hands of competent instructors. This course must be preceded by Courses 1, 2 and 4. Students conditioned on any of these courses may be admitted at discretion of instructor in charge. (At conclusion of second year of. course.)

23. **Summer Course in Field Work.** Similar to Course 22. Students work on advanced railroad surveying and topographical surveying. This course must be preceded by Courses 3, 5 and 22. Students conditioned in any of these courses, may be admitted at discretion of instructor. (At conclusion of third year of course.)

CLAY-WORKING AND CERAMICS

Professor Edward Orton, Jr., Mr. Bleininger

The facilities of the Department comprise: 1st. A convenient chemical laboratory, specially designed and equipped for the anaylsis and decomposition of silicates. Provision has been made for the use of hydrofluoric acid with safety, and the platinum ware has been made to order with this purpose in view. 2d. A complete mechanical outfit for the preparation of clays for pottery manufacture and the production of the ware itself, of any grade from earthen wares to porcelain. The machinery is of the latest types and comprises all important varieties in use for grinding, tempering, washing, filtering and molding. 3d. A similar plant for the manufacture of brick, tiles, pipes and hollow goods. The machinery here is of full size and samples up to a ton in weight can be received and transformed into the finished articles by any or all of the standard methods in commercial use. The power for this purpose is derived from a fine electric motor, driven from the University power plant. 4th. A kiln house, equipped with a kiln in which several hundred bricks, or an equivalent quantity of sewer-pipe, stoneware, or pottery can be burnt. The fuel is intended to be coke, except in special cases where the fuel available for burning clay wares is to be made the subject of test. There is also provided a crucible melting furnace and a muffle furnace for testing glazes. A muffle kiln of larger size for burning pottery, glazed ware and decorated wares has recently been put into operation. 5th. A ceramic museum, containing a collection of American pottery and clay products of every class, is in process of installation. 6th. A library of the best literature on the subject, mainly German, but containing a few English and French works, and the trade periodicals.

1. **Quantitative Analysis of Simple Minerals.** This course is open only to those who have completed General Chemistry 12. The student begins the quantitative analysis of salts and chemicals, and later works on limestone and other easy materials. Five times a week. (First Term of Second year of both courses in Ceramics.)
2. Continuation of Course 1. The student begins the quantitative analysis of clays and complex minerals, working first on samples of known composition, and later on unknown materials. Five times a week. (Second Term of second year of both Courses in Ceramics.)
3. Continuation of Course 2. The student completes the ultimate analysis of clays and begins the proximate or "Rational" analysis of clays and pottery bodies, following the methods of Seger. Five times a week. (Third Term of second year of both courses in Ceramics.)

4 **A Series of Lectures** (supplemented by frequent recitations) on the origin, composition and properties of clays and other minerals employed in the clay, glass and cement industries. Five times a week. (First Term of third year Course in Ceramics, and First Term of second year of Short Course in Clay-Working.)

5. Continuation of Course 4. A series of lectures, with recitations, on the general principles of the manufacture of bricks and the coarser clay wares, including the selection and winning of the materials, their preparation, manufacture, burning and testing. Five times a week. (Second Term of third year of Course in Ceramics and Second Term of second year of Short Course in Clay-working.)

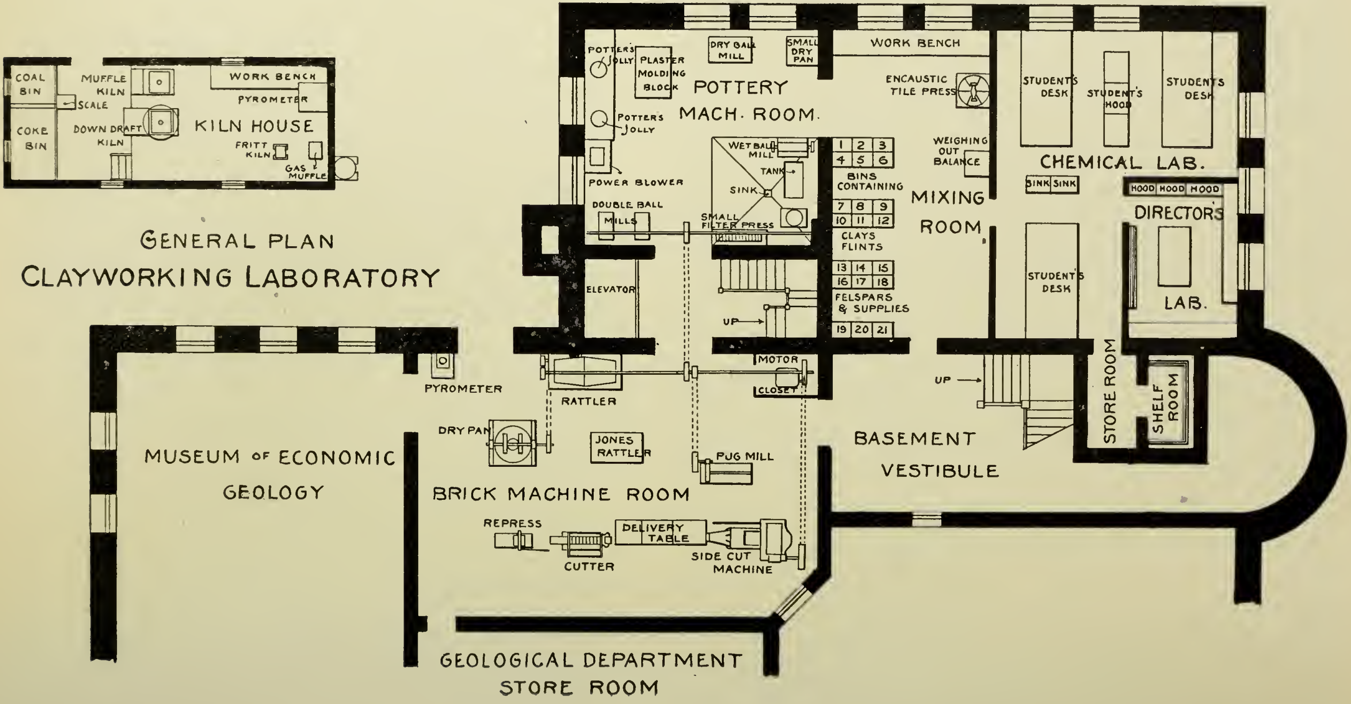
6. Continuation of Course 5. A series of lectures, with recitations, on the classification and manufacture of pottery and the finer grades of clay wares, including the selection of the materials, preparation of the bodies, manufacture of the ware, preparation of the glazes, burning and decoration of the wares and the pyrometry of ceramics. Five times a week. (Third Term of third year of Course in Ceramics and Third Term of second year of Short Course in Clay-working.)

7. Continuation of Course 3. Open only to those who have completed that course. The analysis of glasses and glazes, devoting special attention to the use of hydrofluoric acid in silicate analysis, and to the determination of lead and boracic acid. Five times a week. (Second Term of third year of Course in Ceramics.)

8. Continuation of Course 7. The further analysis of colored glasses and glazes, enamels, and ceramic colors, especial attention being given to the determination of the coloring and opacifying oxides. Five times a week. (Third Term of third year of Course in Ceramics.)

9. **Laboratory Work in Ceramics.** Open only to those who have completed Courses 3 and 6. The student will undertake the production of such wares as are made from single clays; then wares made by blending two or more natural clays; and, then, such wares as are made from an artificial body. In each case the bodies made will be burnt and tested. Five times a week. (First Term of fourth year of Course in Ceramics.)

10. Continuation of Course 9. The student will practice on the production of glasses and glazes, beginning with the natural "slip glazes" and taking successively the soft raw-lead glazes, the fritted lead-boracic-acid glazes, and the hard-fire leadless procelain glazes. In each case the glazes will be made for use on some definite body, and will be made to "fit." Five times a week. (Second Term of fourth year of Course in Ceramics.)



GENERAL PLAN
CLAYWORKING LABORATORY

11. Continuation of Course 10. The student will practice on the use of the coloring and opacifying oxides in glazes, and on the production of colors for the decoration of pottery, and of body-stains. Five times a week. (Third Term of fourth year of Course in Ceramics.)

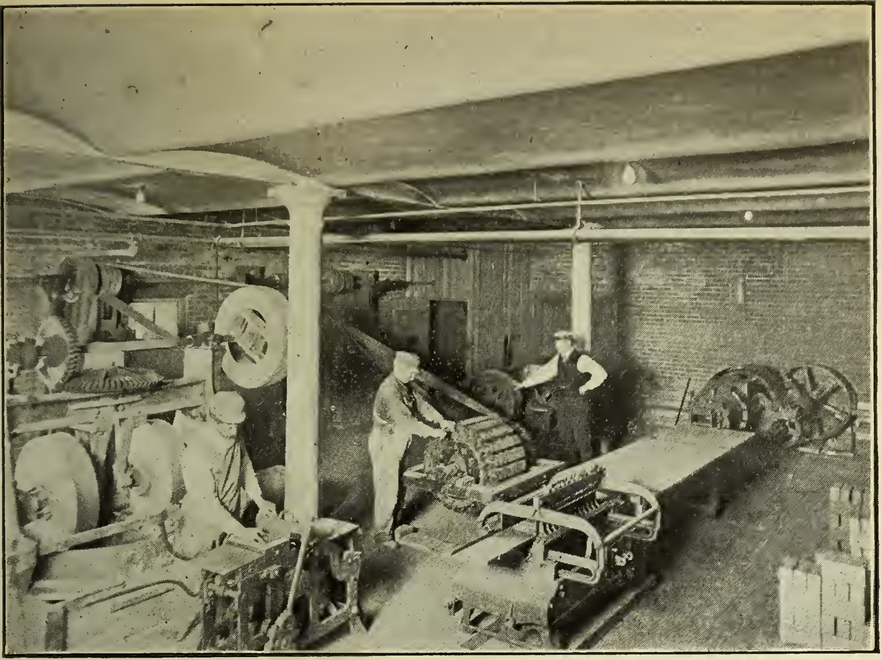
12. **A Series of Lectures** on the manufacturing and testing of natural and Portland cements and hydraulic silicates. Open to students who have had courses 3 and 6. Facilities for laboratory work in making, burning and testing cements will be given. Five times a week. (Second Term of fourth year of Course in Ceramics.)

13. **Practice** in making drawings and specifications for brick kilns, brick dryers, pottery kilns, gas producers, glass pot-furnaces, glass tanks, cement kilns and burning cylinders. Students will be allowed to specialize along the lines they intend to follow. Twice a week. (Second Term of fourth year of Course in Ceramics.)

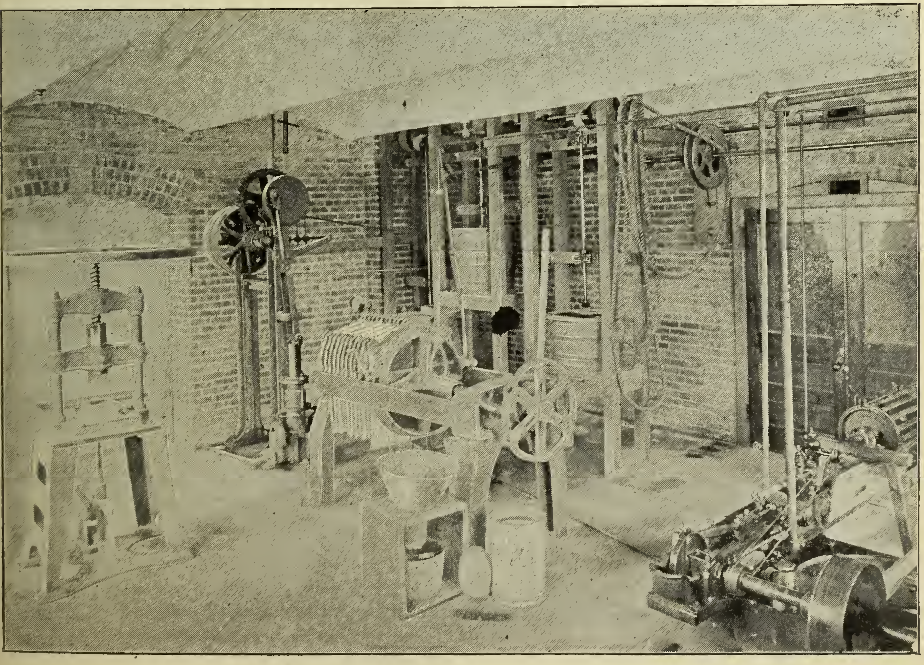
14. **Mineral Reports.** A series of lectures on the prospecting and opening of mineral properties and ceramic plants. Frequent trips will be made to the important clay-working centers of Ohio for field work and practice in observation. Students will be allowed to specialize along their intended lines. Five times a week (Third Term of fourth year of Course in Ceramics.)

15. **Thesis.** See requirements for graduation, page 94.

16. **General Principles of Applied Ceramics.** A series of lectures on the chemical technology of the clay, glass and cement industries. Three times a week. (Third Term of fourth year of Course in Chemistry.)



BRICK-MAKING LABORATORY



POTTERY-MAKING LABORATORY

DRAWING

Associate Professor Bradford, Assistant Professor French, Mr. Lewis

This Department occupies the entire third floor of Hayes Hall and is equipped for the illustration of the work in drawing and for practical training in the same. The equipment for teaching freehand drawing consists of flat and shaded copies in pencil and charcoal, wooden models of geometric forms, plaster casts or ornaments, flowers, fruit and antique statuary; easels and drawing tables are provided for pen and ink drawing, water-color and oil painting, also, a well selected line of work from artists of recognized ability. For mechanical drawing, O. S. U. improved drawing tables (30″ by 36″ tops), a set of the celebrated Schroeder models, and a collection of shop drawings and facilities for blue-printing are provided. There is also a well-arranged and equipped photographic dark room, printing outfits, copying camera, four view cameras, lenses of long and short focus, flash lamp and a shutter for instantaneous photography. In addition to the above, the library contains a well-chosen collection of books pertaining to the work of the Department.

1. **Freehand Drawing.** Practice and occasional lectures. Pencil, charcoal, pen and water-color drawing from copies, models and plaster casts.

   One drawing period a week, three terms, first year of short Course in Industrial Arts.

   Two drawing periods a week, first term of second year of Short Mining Course.

   Two drawing periods a week, first and second terms of first year of all four-year Engineering Courses.

   Three drawing periods a week, three terms of first year of Course in Architecture.

2. **Lettering.** Practice and occasional lectures.

   Two drawing periods a week, third term of first year of short Course in Industrial Arts and second year of Short Mining Course.

   Three drawing periods a week, third term of first year of all four-year courses, and of the three-year Course in Architecture.

   This course must be preceded by Course 1.

3. **Mechanical Drawing.** Lectures or recitations, one period a week. Practice two periods a week. Subjects: Orthographic, Isometric and Oblique Projection and elementary Working Drawings. (First Term of second year of all four-year courses, except Chemistry, and in three-year Course in Architecture and two-year Course in Mining and Industrial Arts.)

   Lectures or recitations two periods a week. Practice one period a week in both Courses in Industrial Arts and in all four-year

MECHANICAL DRAWING ROOM

FREE HAND DRAWING ROOM

courses, except Civil Engineering and Chemistry; three periods a week in Civil Engineering and Architecture. Subject: Descriptive Geometry. (Second Term of second year.)

Lectures or recitations, one period a week. Practice, two periods a week in both Courses in Industrial Arts and in all four-year courses, except Chemistry; four periods a week in Course in Architecture. Subject: Shades, Shadows and Perspective. (Third Term, second year.)

This course must be preceded by Course 2.

4. **Draughting and Blue-printing.** Practice and occasional lectures. Three periods a week. (Second Term of second year in the Short Mining Course.)

This course must be preceded by the first term of Course 3.

5. **Technical Drawing.** Lectures and practice. Rules and methods for working drawings, tracing, blue-printing, machine design and practice in making same to represent form and dimensions for shop use. Three periods a week. (First Term of third year of Mechanical and Electrical Engineering and Industrial Arts Courses.) This course must be preceded by Courses 2 and 3.

7. **Photography.** Lectures and practice. Lectures: Optics of Photography, Chemistry of Photography, Exposing and Developing, Printing, Lantern Slides, Orthrochromatic Photography and some of the applications of Photography. Practice in outdoor, interior, instantaneous and flashlight photography, copying, lantern slides and printing. Two periods a week. (First Term of second year of Course in Architecture; Third Term of third year of Courses in Civil and Mechanical Engineering: First Term of fourth year of Course in Ceramics; Third Term of fourth year of Course in Mining Engineering.)

8. **Mechanical Drawing.** Lectures and practice. Geometric and Projection Drawing. Two periods a week. (First and Second Terms of first year of short Course in Industrial Arts.)

11. **Mechanical Drawing.** Lectures and practice. Five periods a week. (Second Term of second year of Short Course in Clayworking.)

12. **Clay Modeling.** Modeling in clay and casting in plaster, ornamental forms from designs, photographs, nature and original designs. Two periods a week. (Second and Third Terms of second year of Course in Architecture.)

This course must be preceded by Course 1.

14. **Pen Drawing.** Two periods a week. (First Term of second year of the Course in Architecture.)

This course must be preceded by Course 1.

MODELING ROOM

PHOTOGRAPHIC LABORATORY

Architecture

1. **Orders of Architecture.** Detail Drawing of the Orders, to accompany the study of Ancient Art. One lecture and four practice periods a week. (Second Term of second year of Course in Architecture.)

2. **Styles of Architecture.** Lectures and drawing of Architectural Details representing the characteristic styles in Architecture. One lecture and four practice periods a week. (Third Term of second year of Course in Architecture.)

3. **Designing.** Lectures and Designing of Architectural structures adapted to modern requirements. Five periods a week. (First, Second and Third Terms of third year of Course in Architecture.)

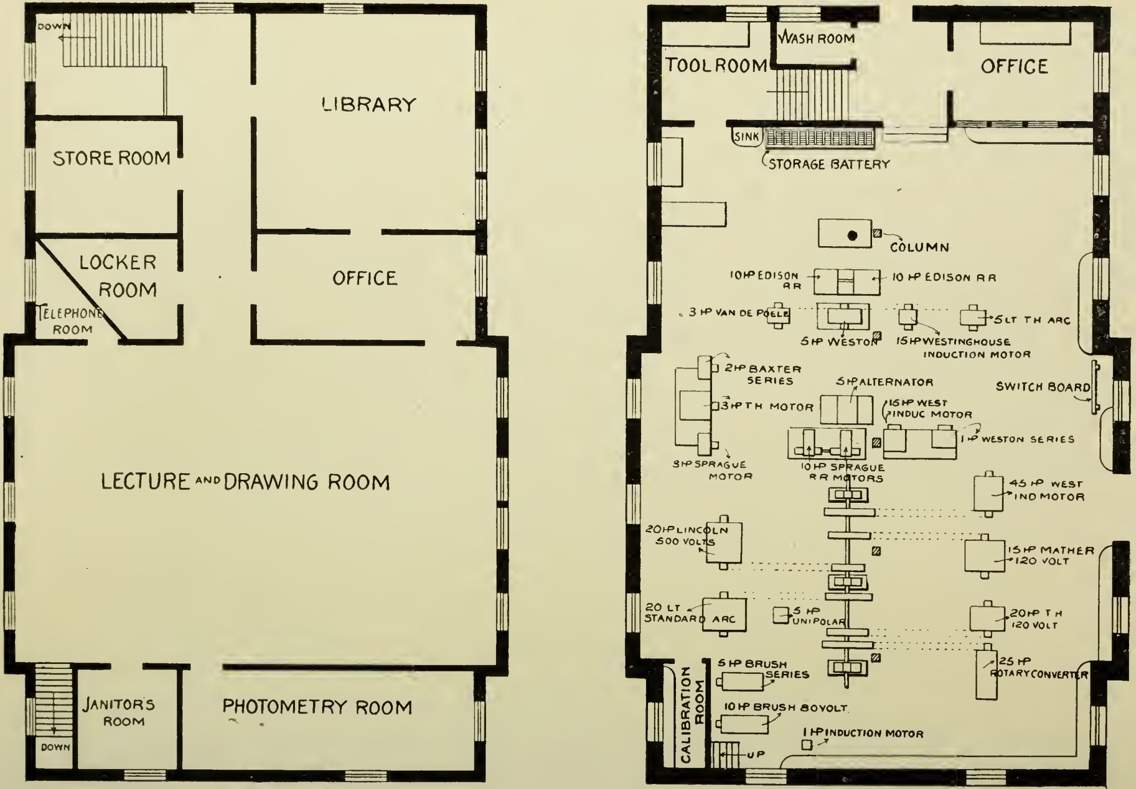
4. **Specifications.** Lectures and practice in preparing Specifications for Architectural Structures. Two periods a week. (First Term of third year of Course in Architecture.)

5. **Decoration and Ornament.** Lectures. The practice part of this course will be incorporated in Courses 3 and 8. Three periods a week. (Second Term of third year of Course in Architecture.)

6. **Estimates.** Lectures and practice in preparing estimates for structures designed in Courses 3 and 8. The duties of a superintendent will be considered in this course. Four periods a week. (Third Term of third year of Course in Architecture.)

7. **Heating and Ventilating.** Lectures. The practical applications of this course will be incorporated in Courses 3 and 8. Five periods a week. (Second Term of third year of Course in Architecture.)

8. **Designing.** Lecture and Practice. Designing of buildings requiring steel and fire-proof construction. Five periods a week. (Third Term of third year of Course in Architecture.)



SECOND FLOOR PLAN FIRST FLOOR PLAN

ELECTRICAL LABORATORY.

ELECTRICAL ENGINEERING

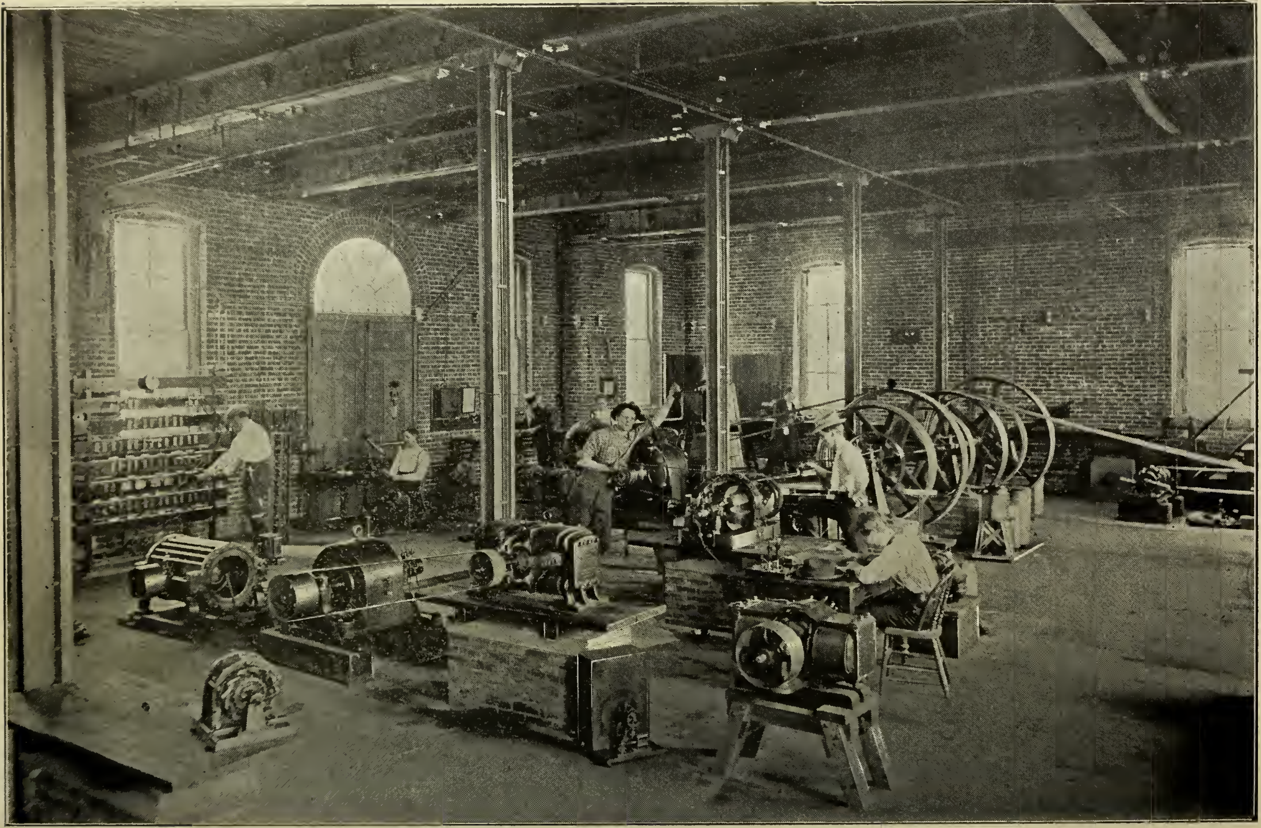
Associate Professor Caldwell, Mr. Fish

This Department has excellent facilities for practical experimental work with dynamo machinery and other electrical apparatus. The elementary electrical testing is provided for in the Physical Department, which permits this Department to devote its energies to the study of engineering apparatus proper. The dynamo equipment consists of twenty-five machines of various makes and sizes from 40-H. P. down; aggregating over 240 horse-power. These include 110 and 500 volt direct and alternating current generators, polyphase motors, arc and incandescent lighting generators, railway and stationary motors, a rotary converter specially designed for experimental work, and a unipolar dynamo. The two latter, with an alternating current generator and a 2-phase motor, were built by the students, it being the policy of the Department to build as much of its apparatus as possible. There are also a number of transformers of different makes, including one for welding and one of special design for testing, both built at the University. Arc lamps of different styles, a 10-kilowatt-hour storage battery, condensers and resistances, and magnetic testing apparatus also form part of the equipment. The list of measuring instruments is quite complete, and includes a standard Weston voltmeter and eleven other Weston volt and am-meters, also four Kelvin static voltmeters, five dynamo-meters, two watt-meters, galvanometers and 14 other am-meters and voltmeters of different makes. There is a telephone laboratory—with apparatus for comparative tests, a variety of transmitters and receivers, lines running to another building, and material illustrative of switch-board practice. Photometry is given at present in the Physical Laboratory, where the equipment in this line is excellent. Power for running the dynamo laboratory is supplied by three induction motors from the University Power Plant. There is also a small but well selected and growing collection of photographs, blue-prints, and material illustrative of Electrical Manufacture. The library of the Department is kept in the building and is especially valuable on account of the completeness of its sets of periodicals and transactions.

The University Power Plant (see pages 88-89) is of great value as illustrative of a model installation. This plant has been mostly installed by students who receive pay for such work.

The Department has its own machine shop and a machinist who gives half his time to construction and repair work.

Columbus and neighboring towns have many electrical plants of different systems which welcome visiting students. It is also usual to make an inspection trip to one or more of the cities of the State to visit manufacturing establishments and other points of electrical interest.



ELECTRICAL LABORATORY

The Electrical Hall was built in 1889 by a special appropriation of the Legislature, and is occupied entirely by the Department of Electrical Engineering. It is a two-story brick building about seventy-five by forty-five feet. In the first floor, sixty feet are taken up by the dynamo room, which is well lighted and has an asphalt floor, laid on concrete. The remainder of the floor is occupied with an office and apparatus room, a shop and a calibrating room arranged for the accurate and easy standardization of the instruments used in the laboratory. On the second flood are a lecture and draughting room 45 by 30 feet, a reading room and library, office, photometric laboratory, stock room, locker room and janitor's room. The building and its equipment are valued at about fifteen thousand dollars.

2. **Electrical Engineering.** Lectures, Recitations and Problems. Theory of dynamo-electric machinery, including direct current and alternating current generators and motors; methods of regulation and control; circuits, lamps and auxiliary apparatus; storage batteries; applications of electricity to street car and mine-working; design, construction and management of plant. Five times a week. (First, Second and Third Terms of fourth year of Course in Electrical Engineering.)

3. **Electrical Designing.** Including D. C. and A. C. generators and motors, transformers, distribution, etc. Three times a week. First, Second and Third Terms of fourth year of Course in Electrical Engineering.)

4. **Electrical Laboratory.** A full experimental course in the handling and testing of generators, motors, storage batteries, circuits, etc. Three half days a week. (First, Second and Third Terms of fourth year of Course in Electrical Engineering.)

6. **Electrical Engineering.** Lectures on direct and alternating circuits, dynamo machinery, transformers, accumulators and applications. Twice a week. (First and Second Terms of fourth year of Civil, Mining and Mechanical Engineering Courses.)

7. **Electrical Engineering.** Laboratory work on the subjects treated in Course 6, which it accompanies. Twice a week. (First and Second Terms of fourth year in Civil, Mining and Mechanical Engineering Courses.)

FRENCH LANGUAGE

Professor Bowen, Mr. Brush

1. **Elementary French.** Grammar and reader, modern prose and plays. Four times a week. (Offered in First, Second and Third Terms of first year in Civil, Mining, Mechanical and Electrical Engineering Courses as an alternative with German 1.)
2. **Modern French Literature.** Four times a week throughout the year. Open to those who have completed Course 1.
3. **Science Reading.** Open to those who have completed Course 1 (or an equivalent). Twice a week. (First, Second and Third Terms of second year in Civil, Electrical, Mechanical, Mining and Ceramic Courses.) Offered only as an elective study.

GEOLOGY

Professor Orton, Associate Professors Prosser and Bownocker.

The University is able to present unusual advantages for the study of Geology. By an act of the Legislature it has been put in possession of all the collections made by the late geological survey, and these collections have been supplemented by valuable additions of fossils and minerals from various sources. The State collection embraces a very complete representation of every geological formation shown in Ohio. In its new and ample quarters the Department offers exceptionally good opportunities for work in the lithological, petrographical and modeling laboratories.

Orton Hall, completed at a cost of more than $100,000, is designed for the permanent accommodation of the large geological collection of the University and for work and instruction in the Department of Geology. A portion of it is occupied by the library and reading room. The building is two stories in height, with a high basement, is built of brick and faced with sandstone, and is fire-proof throughout. Some of the material was contributed by various quarries of the State of Ohio, and almost all of the finer varieties of Ohio building stone are represented in the columns, walls and ceiling panels of the vestibule. At the right of the main entrance is the geological lecture room and professor's private room; at the left is the University library, reading room and librarian's private room. The central and rear portion is occupied by the geological and paleontological museums. The petrographical laboratory is located on the ground floor. In the basement a room is used for work in geographical modeling, the finished models being afterwards placed in the collection of such models in a room set apart for the purpose on the second floor. The basement accommodates also the museum of economic geology. A paleontological laboratory or working room is also provided on the second floor.

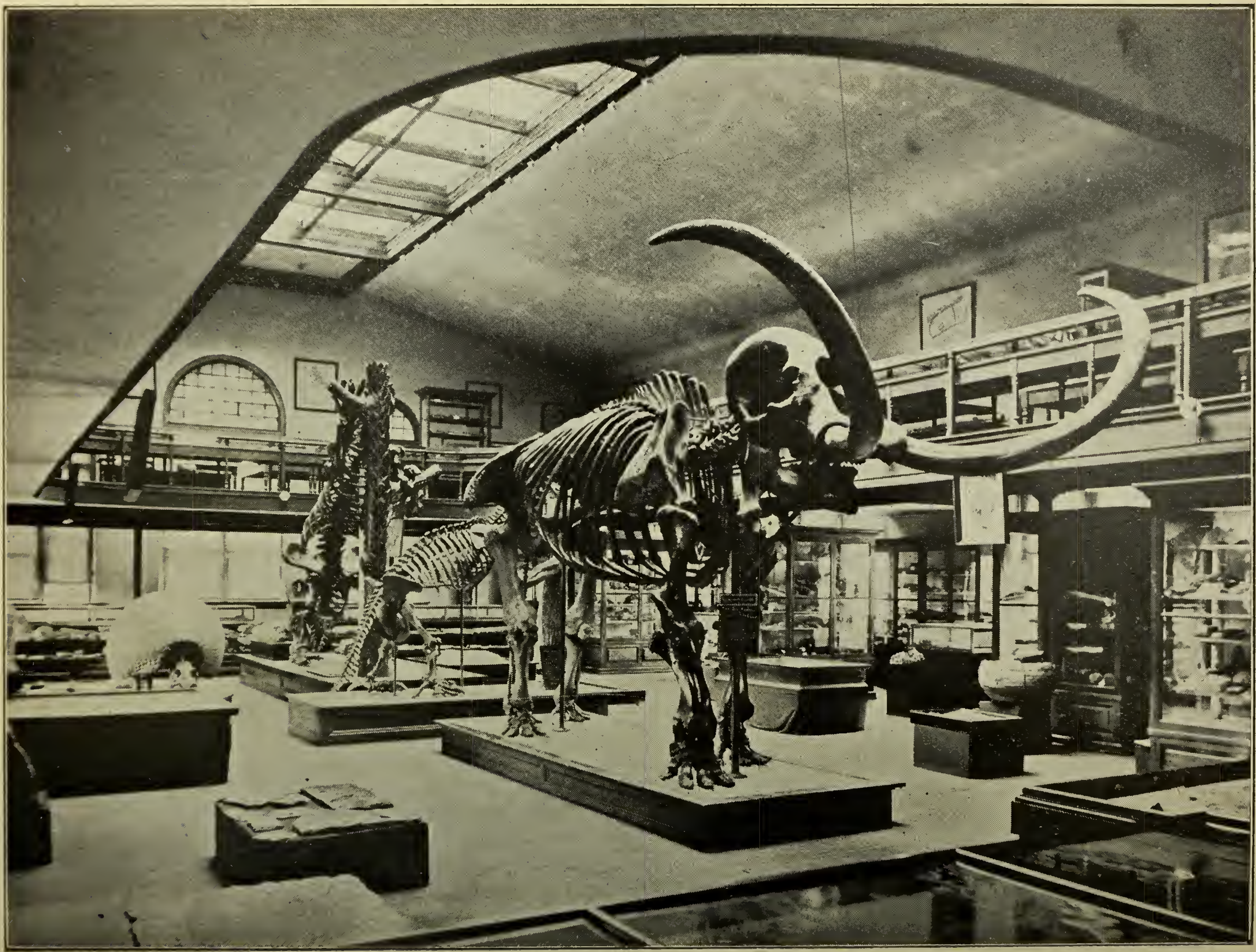
1. **Physical Geography.** Lectures and Recitations. Geikie's Elementary Lessons, supplemented by lectures, map drawing, and the study of geographical models. Five times a week. (Third Term of first year of Short Courses in Mining and Ceramics, and Third Term of second year of Short Course in Industrial Arts.)
2. **General Geology.** Cosmical Geology, Lithological Geology, Dynamical and Structural Geology. Books of reference used by students in preparation of their work: Green's Physical Geology, Geikie's Text Book of Geology, LeConte's Elements of Geology, Hunt's Chemical Geology, Daubree's Geologic Experimentale. Five times a week. (First Term, third year, Civil Engineering Course, and First Term, fourth year, Mining and Ceramic Courses.)

   Paleontological Geology, Historical Geology. Books of reference used by students in preparation of their work: Nicholson's Paleontology, Zittel's Paleontologie, Ohio Geological Reports, Paleontology of New York. Five times a week. (Second Term, third year, Civil Engineering Course, and Second Term, fourth year, Mining Course.)
3. **Economic Geology.** Lectures. Economic materials of stratified rocks, clays, limes, cements, coals, iron ores, phosphates, petroleum, etc. Economic materials derived from veins and igneous rocks, gold, silver, copper, mercury. Gems. Books of reference used by students in preparation of their work: Publications of U. S. Geological Survey, State Geological Surveys, Phillips' Ore Mining. Five times a week. (Third Term, fourth year, Courses in Civil, Mining Engineering and Ceramics.)
4. **Elementary Geology.** Lectures and Recitations. Text-book: LeConte's Class Book of Geology. Five times a week. (Second Term of second year in Short Course in Mining.)

GERMAN LANGUAGE

Professor Eggers, Associate Professor Mesloh

1. **Elementary.** Four times a week. (First, Second and Third Terms of first year of Ceramic and Chemical Courses. Offered in First, Second and Third Terms of first year of Courses in Civil, Electrical, Mechanical and Mining Engineering, as alternative with French 1.)
2. **Science Reading.** Twice a week. (First, Second and Third Terms of second year of Course in Chemistry.) Offered as an elective study in other Engineering Courses.
4. **German Literature.** Four times a week. (First, Second and Third Terms of first year of Course in Chemistry. Required of students entering with German 1 as their only entrance credit in Language.)



GREEK LANGUAGE AND LITERATURE

Professor Smith, Assistant Professor Hodgman

1. **Lectures on History of Ancient Art.** Twice a week. (First, Second and Third Terms of second year of Course in Architecture.)

INDUSTRIAL ARTS AND SHOPWORK

Industrial Arts

Professor Sanborn, Mr. Knight, Mr. Smyser, Mr. McIntire

The shops, which occupy the north wing of Hayes Hall, afford excellent facilities for instruction in both the practical details and the underlying principles of carpentry, pattern-making, forging, moulding, foundry work and machine work.

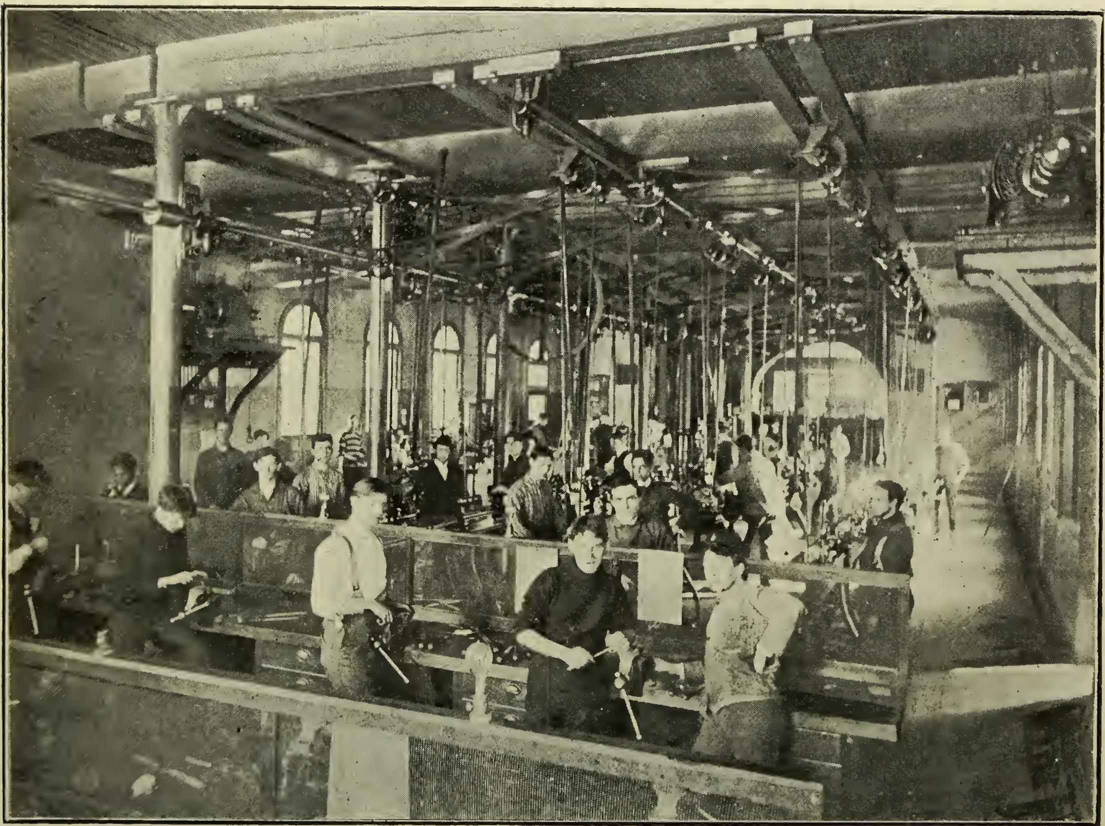
The carpenter and pattern shop is equipped with twenty-five benches with complete sets of carpenter tools for each and a large number of special tools for general use, twenty-three pattern-makers' turning lathes, with cupboards containing the necessary turning and pattern-making tools under each, a pony planer, a buzz planer, a circular rip and cross-cut saw, a scroll saw, a trimmer and a power grindstone.

The forge shop is equipped with twenty stationary forges, with anvils and tools for each, a heating forge, a portable hand forge, a foot-power hammer, a blacksmith's drill and a punch, shear and bar cutter. The blast for the forges is furnished through under-ground piping by a 45″ Buffalo pressure blower, and the smoke is removed by a 55″ Buffalo exhaust fan overhead. Both of these fans are driven by a 15 horse-power electric motor.

The foundry is equipped with a 24″ Calliau cupola, the blast for which is furnished by a 30″ Buffalo blower; two brass furnaces, one 16 inches in diameter and the other 20 inches in diameter; a core oven, benches for iron and brass moulding, core-making and cleaning of castings, a space for floor moulding 30 feet by 40 feet, besides all the necessary moulding tools, flasks, crucibles, ladles, tongs, etc.

The machine shop is driven by a 30 horse-power electric motor from above, and is equipped with the following tools: Twenty-eight benches for vise work, with complete sets of tools; eight speed lathes, sixteen engine lathes, two planers, two shapers, a milling machine, an upright drill, a sensitive drill, grinding machines for both plane and cylindrical surfaces, tool grinders, emery wheels, etc. This machinery is furnished with all the necessary tools, and the tool-room is equipped with full sets of drills, taps, dies, milling cutters, standard plugs, guages, threads, micrometers and a great variety of special tools.

Hayes Hall is a large building of pressed brick and brown sandstone, completed and equipped at a cost of about $70,000. It is de-



INDUSTRIAL DEPARTMENT — MACHINE SHOP

voted to instruction in Industrial Arts, Drawing, Civil Engineering, Mechanical Engineerng and Domestic Science. The central portion is three stories high and the front wings are two stories each. On the first floor are two offices, the rooms of the Department of Domestic Science and two lecture rooms; besides the machine shop, the forge shop and the foundry. On the second floor are the carpenter and pattern shops, and the Department of Civil Engineering, with private rooms annexed.

The Department of Drawing occupies the third floor for instruction in mechanical and free-hand drawing and photography.

1. **Tools and Machines.** Lectures and recitations on hand and machine tools and the principles underlying their construction and operation, and materials used in construction. Three times a week. (First, Second and Third Terms of third year of Course in Industrial Arts, and second year of Short Course in Industrial Arts.)

2. **Designing.** Problems in design, to accompany Course 1. Three times a week. (Second and Third Terms of third year of Course in Industrial Arts.)

3. **Shop Equipment, Appliances and Management.** A continuation of Course 1. Three lectures a week. (First, Second and Third Terms of fourth year of Industrial Arts Course.)

4. **Advanced Designing.** A continuation of Course 2. Three drawing periods a week. (First, Second and Third Terms of fourth year of Course in Industrial Arts.)

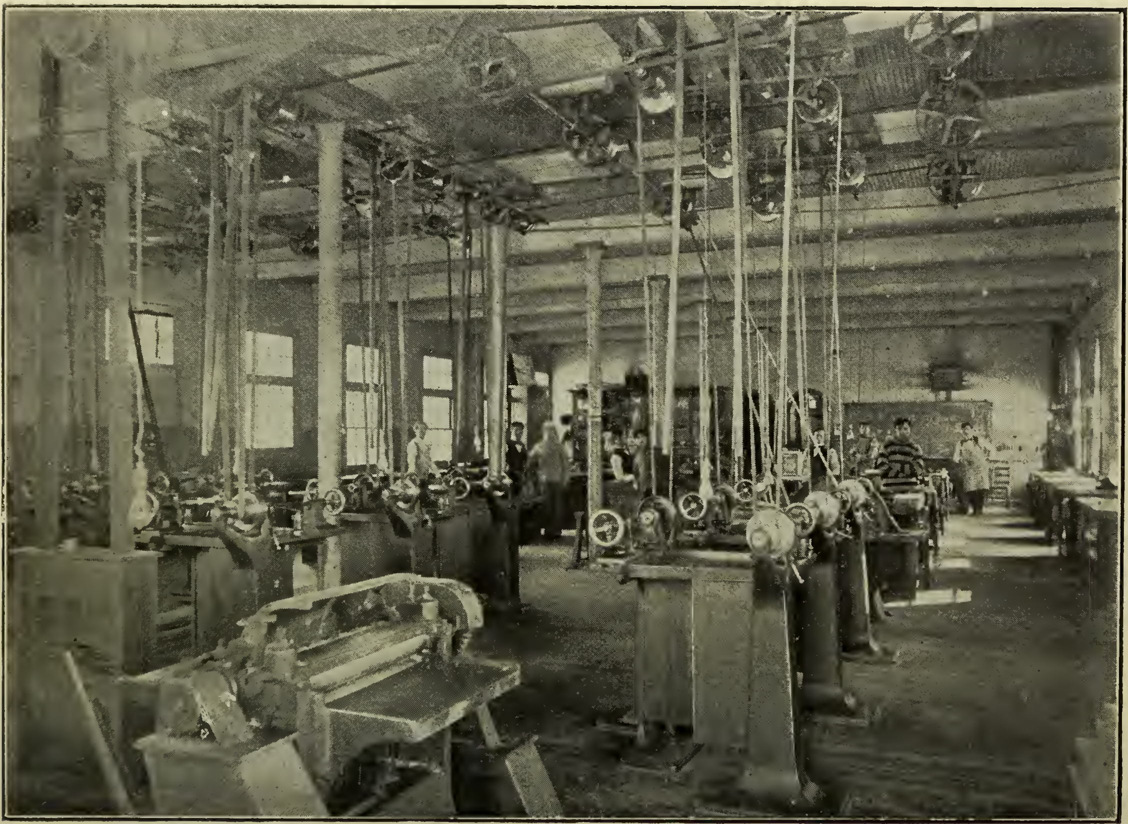
5. **Workshop Appliances.** Lectures and problems on the construction of shop buildings and the arrangement of machinery; power required and the means of transmission; friction in line-shafting and the efficiency of machinery; automatic machines and special shop appliances. Three times a week. (Third term of fourth year of Course in Mechanical Engineering.)

6. **Machine Design.** Practical application of the principles of machine design. Five times (ten hours' practice) a week. (Third Term of third year of Courses in Electrical and Mechanical Engineering.)

Shop Work

NOTE.—For time requirements, credit given, and all similar information concerning shopwork courses, see table page 68.

3. **Foundry Work.** Exercises and practice in tempering sand and preparing moulds of machine parts in the sand, core-making, melting iron and brass and pouring castings.



INDUSTRIAL DEPARTMENT — WOODWORKING SHOP

4. **Chipping and Filing.** Exercises and practice in vise work, including chipping in cast and wrought iron, surface filing, squaring, fitting, finishing, and the scraping of surface plates.

7. **Carpentry and Pattern Making.** Exercises and practice in carpentry, woodturning and pattern making, including sawing, planing, mortising, splicing, framing and other work involving the use of the ordinary carpenter tools; center and chuck turning; the making of finished patterns; and enough elementary molding to illustrate draft, parting, cores, etc.

8. **Carpentry: Cabinet Work.** Exercises and practice in cabinet making, including panelling, mitre and dovetail joints, etc.; use of power tools.

9. **Advanced Pattern Making.** Continuation of pattern work of Shopwork 7.

10. **Carpentry: Building.** Advanced work in carpentry, including the use of two foot steel square in laying out of rafters, roof trusses, joists, etc.; stair building; doors, window frames, etc.

11. **Forging.** Exercises and practice in iron and steel forging, includsuch operations as drawing, bending, forming, upsetting, welding and the making and tempering of punches, drills, chisels, lathe tools, springs.

12. **Advanced Forging.** Tool making, tempering of taps, dies, cutters, etc.; annealing; case hardening; ornamental iron work, etc.; visits to shops.

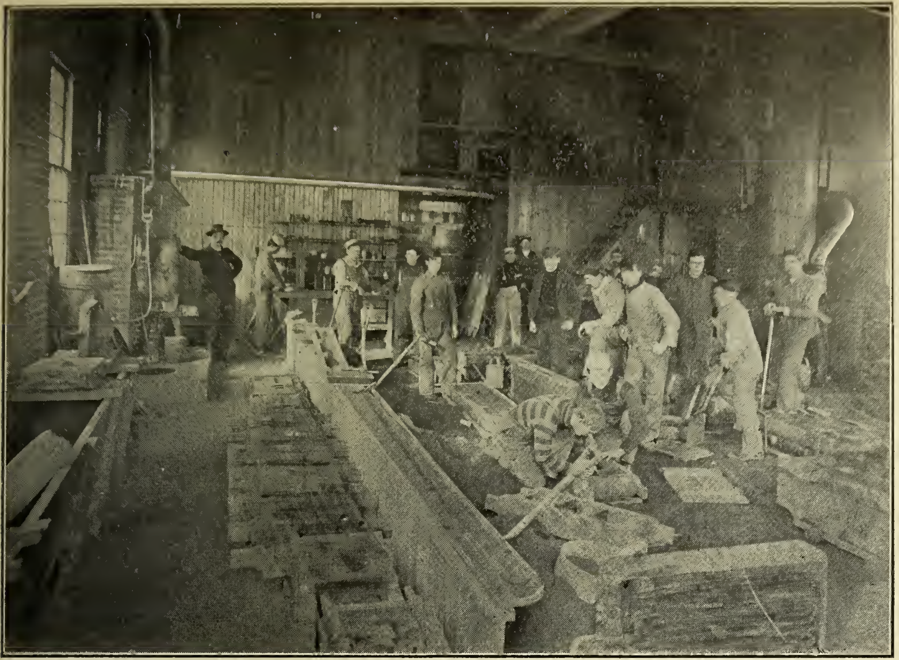
13. **Machine Work.** Exercises and practice in hand-turning in iron and brass on speed lathes; in straight and taper turning, boring, fitting, chucking, thread-cutting on engine lathes.

14. **Machine Work.** Exercises and practice on the lathe, planer, shaper, drill press and milling machine, with use of small tools as drills, taps, dies, reamers, counterborers, etc.; construction of parts of actual machines.

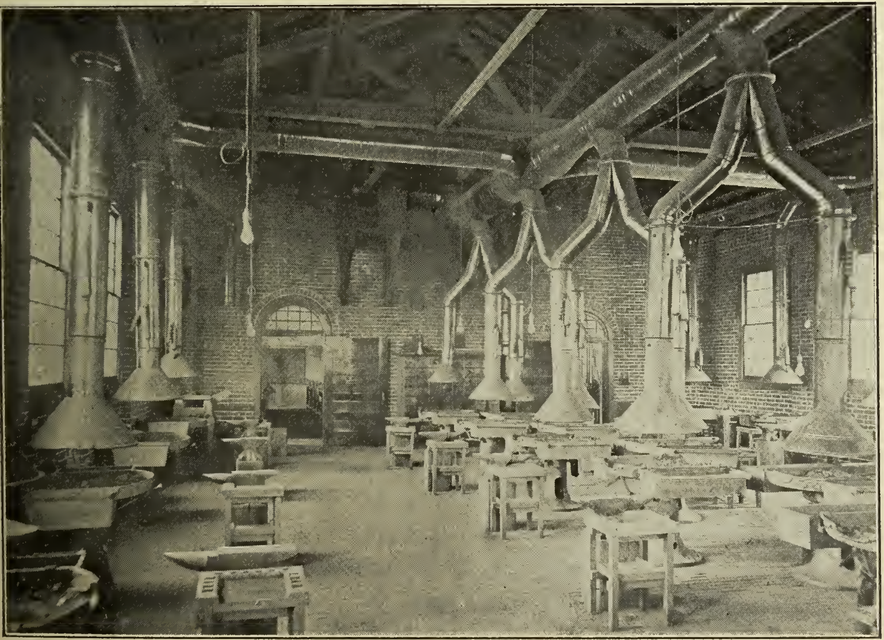
15. **Advanced Machine Work.** Exercises and practice on turret lathe, universal, surface and tool grinding machines, gear cutting, etc.

16. **Advanced Machine Work.** The construction and use of jigs and templates; the accurate laying out of work; the duplication of parts, the production of work rapidly and economically, etc.

17. **Advanced Machine Work.** The making and use of special tools and fixtures, standard plugs and collars, standard caliper and limit guages; error limits in modern machine construction; methods of testing the accuracy of machine tools, etc.



INDUSTRIAL DEPARTMENT — FOUNDRY



INDUSTRIAL DEPARTMENT — FORGEROOM

Shopwork Required

Number	Credit	Year	Term	Courses in
3	2	2	1	M. E.: I. A. (short).
	3	2	1	I. A.
4	2	2	1	E. E.
	3	3	1	I. A.
	3	2	1	I. A. (short).
	3	2	2	M. E.
	2	1	3	Cer. (short).
	2	2	3	E. M.: Cer.
7	3	1	1	Arch.: I. A.: I. A. (short).
	3	2	1	Chem.
	2	2	1	Cer.: E. M.
	4	1	3	E. E.: M. E.
8	3	1	2	Arch.: I. A.: I. A. (short).
9	3	1	3	I. A.
10	3	1	3	Arch.
11	2	2	1	E. E.
11	3	2	1	M. E.
	2	2	2	Cer.: E. M.
	3	2	2	Chem.: I. A.
	3	1	3	Cer. (short): I. A. (short).
	3	2	3	Min. (short).
12	3	2	3	I. A.
13	3	3	1	E. E.
	3	3	2	I. A.
	5	2	2	I. A. (short).
	3	2	3	M. E.
14	3	3	1	M. E.
	3	3	2	E. E.
	3	3	3	I. A.
15	3	4	1	I. A.
	4	3	2	M. E.
	5	2	3	I. A. (short).
16	3	4	2	I. A.
17	3	4	3	I. A.

MATHEMATICS

Professor Bohannan, Associate Professor McCoard, Assistant Professor Arnold, Assistant Professor Swartzel, Mr. Young, Miss Ball

1. **Elementary Algebra.** Venable. Five times a week. (First Term, first year, Short Course in Ceramics.)

2. **Elementary Algebra.** Wentworth. Five times a week. (First, Second and Third Terms, first year. Short Courses in Mining and Industrial Arts.)

3. **Plane Geometry.** Venable. Five times a week. (First Term, first year, Short Courses in Mining and Industrial Arts.)

3a. **Plane Geometry.** Venable. Five times a week. (Second Term, first year, Short Course in Ceramics.)

13. **Solid Geometry.** Venable. Five times a week. (Second Term, first year, Short Courses in Mining and Industrial Arts.)

14. **Plane Trigonometry.** Loney. Five times a week. (First Term, first year, all except two-year Courses; Third Term, first year, Short Courses in Mining and Industrial Arts.)

15. **Analytical and Spherical Trigonometry.** Loney, with notes on Spherical Trigonometry. Twice a week. (Second Term, first year, all except two-year Courses.)

16. **College Algebra.** Taylor. Three times a week. (Second Term, first year, all except two-year Courses.)

17. **Plane Analytics.** Loney. Five times a week. (Third Term, first year, all except two-year Courses.)

18. **Analytics and Differential Calculus.** Loney. Venable. Edwards. Five times a week. (First Term, second year, Civil, Mechanical, Mining, Electrical and Ceramics Courses.)

19. **Differential Calculus.** Edwards. Five times a week. (Second Term, second year, same as 18.)

20. **Integral Calculus.** Edwards. Five times a week. (Third Term, second year, same as 18.)

11. **Differential Equations.** Edwards. Once a week. (First Term, third year, Mechanical and Electrical Engineering Courses.)

8. **Least Squares.** Merriam. Twice a week. (First Term, third year, Course in Civil Engineering.)

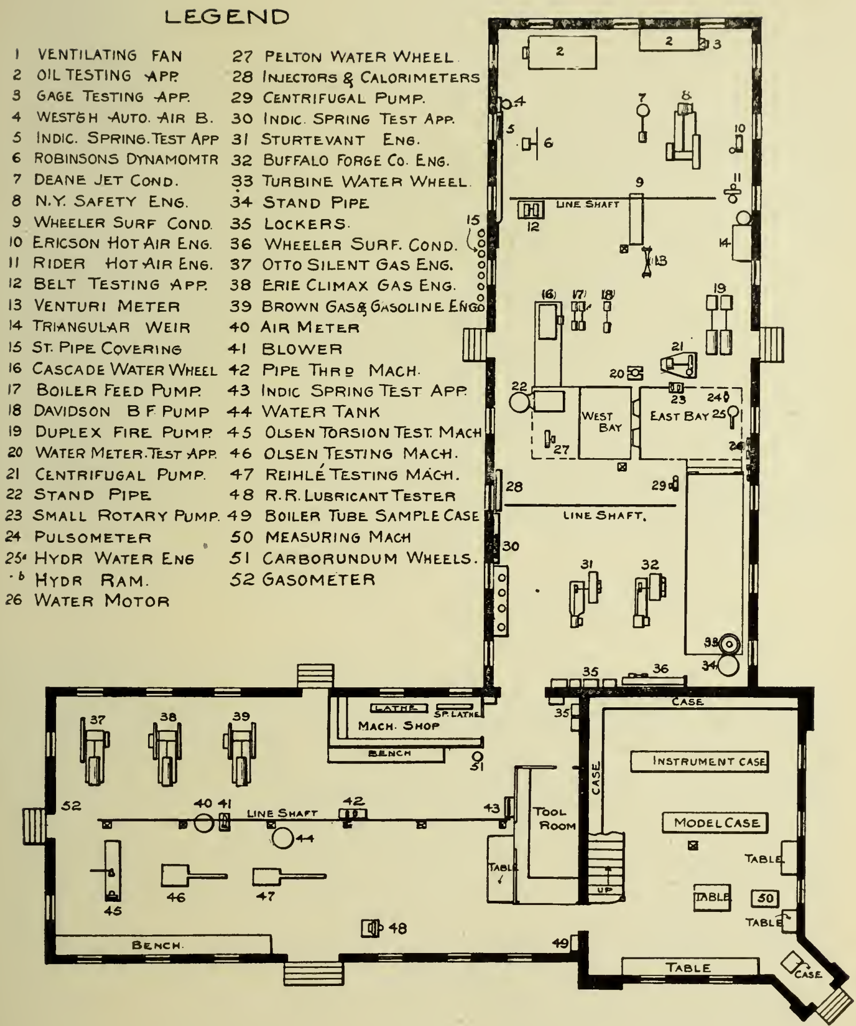
MECHANICAL ENGINEERING

Professor Magruder, Associate Professor Hitchcock, Mr. Judd, Mr. Hale

The lectures and recitations of this Department are held in the west wing of Hayes Hall, and in the second floor room of the Mechanical Hall. Mechanical Hall is a brick building 93 feet front by 32 feet deep, with a wing 32 by 80 feet. The second floor contains a lecture room, and is fitted with drawing tables. The main floor has three large rooms. The Museum is fitted with glass cases for the care of delicate apparatus, measuring machines and other instruments of precision, samples of engineering supplies and specimens of materials which have been tested and broken either in the laboratory or in practice; and also a collection of models of mechanisms and valve gears.

The south laboratory is used for applied mechanics and for gas engineering. Here are located the machines for testing the strength and elasticity of engineering materials, and recording their physical properties automatically and autographically. Oils are tested as illuminants and as lubricants. Belts and pulleys are tested for their slippage, friction and horse-power transmitted. The gas engine plant has three engines, representing gas and gasoline, three methods of ignition, and fly ball and inertia governors. The air is supplied by a fan through a large meter. Temperatures and pressures of air, gas and water are measured. The fresh and burnt gases are analyzed and their heating values determined by a calorimeter. The power is measured at both the indicator and the brake. The laboratory machine shop and tool room are in this room.

The north laboratory is used as a steam engineering and hydraulic laboratory. Four 35-horse-power engines give facilities for testing single or duplex condensing or non-condensing, simple or compound, throttling or automatic cut-off engines, using either a jet or a surface condenser. Pressure and vacuum gauges are calibrated. Indicator springs of five makers are tested either cold or hot. Five kinds of calorimeters determine the moisture in steam before and after passing three different separators. Injectors are tested for lift, quantity, pressure and steam consumption. Steam pumps of six makes, ranging to 800 gallons per minute capacity; two centrifugal and a rotary pump, enable tests of pumps to be made and deliver water at pressures below 150 pounds to two stand-pipes, which in turn supply turbine and cascade, and Pelton, water wheels, and enable experiments to be made on the flow of water through orifices, pipes, valves, etc. Three cisterns, provided with a variety of weirs up to five feet wide, give practice in measuring flowing water. A Venturi meter and a Pitot tube are also used. Ericsson and Rider hot air engines are tested. A Rife hydraulic engine, a Humphryes ram, Gem and Eureka water motors, and a pulsometer, are included in



LEGEND

1 VENTILATING FAN
2 OIL TESTING APP.
3 GAGE TESTING APP.
4 WESTGH AUTO. AIR B.
5 INDIC. SPRING. TEST APP.
6 ROBINSONS DYNAMOMTR
7 DEANE JET COND.
8 N.Y. SAFETY ENG.
9 WHEELER SURF COND.
10 ERICSON HOT AIR ENG.
11 RIDER HOT AIR ENG.
12 BELT TESTING APP.
13 VENTURI METER
14 TRIANGULAR WEIR
15 ST. PIPE COVERING
16 CASCADE WATER WHEEL
17 BOILER FEED PUMP.
18 DAVIDSON B F PUMP
19 DUPLEX FIRE PUMP.
20 WATER METER. TEST APP.
21 CENTRIFUGAL PUMP.
22 STAND PIPE
23 SMALL ROTARY PUMP.
24 PULSOMETER
25a HYDR WATER ENG
b HYDR RAM.
26 WATER MOTOR
27 PELTON WATER WHEEL
28 INJECTORS & CALORIMETERS
29 CENTRIFUGAL PUMP.
30 INDIC. SPRING TEST APP.
31 STURTEVANT ENG.
32 BUFFALO FORGE CO. ENG.
33 TURBINE WATER WHEEL.
34 STAND PIPE
35 LOCKERS.
36 WHEELER SURF. COND.
37 OTTO SILENT GAS ENG.
38 ERIE CLIMAX GAS ENG.
39 BROWN GAS & GASOLINE ENG.
40 AIR METER
41 BLOWER
42 PIPE THRD MACH.
43 INDIC SPRING TEST APP.
44 WATER TANK
45 OLSEN TORSION TEST. MACH
46 OLSEN TESTING MACH.
47 REIHLÉ TESTING MACH.
48 R.R. LUBRICANT TESTER
49 BOILER TUBE SAMPLE CASE
50 MEASURING MACH
51 CARBORUNDUM WHEELS.
52 GASOMETER

GROUND PLAN
OF
EXPERIMENTAL ENGINEERING LABORATORY

the hydraulic apparatus, all of which are connected and prepared for complete tests.

A complete set of Westinghouse air-brake apparatus, a blower and a ventilating fan, enable experiments to be performed in the flow of air. They are supplemented by tests of the heating and ventilating plants in the buildings of the campus.

In addition to the apparatus and equipment of the power plant of the University (for description see page 88), the power house at Townshend Hall contains a horizontal, return tubular boiler, two steam engines and an ammonia refrigerating machine, making the facilities on the campus for testing quite complete. Machinery, apparatus and appliances are continually being presented, built or purchased, and the student is given an opportunity to test everything under practical conditions of operation. Besides the laboratory facilities, opportunities frequently arise to test machinery, engines or boilers in the city, and in these tests the students take part.

3. **Mechanism.** Lectures and recitations on the principles of mechanism and mechanical movements. Five times a week. (Second Term of third year of Mechanical and Electrical Engineering Courses.)

The accurate laying out of movements, embodying the principles of mechanism. Twice a week. (Third Term of third year of Course in Mechanical Engineering.)

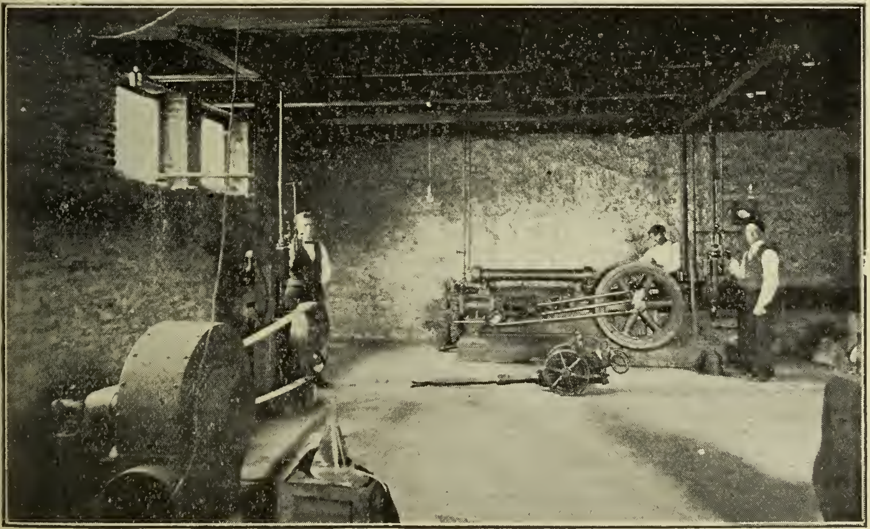
6. **Analytical Mechanics.** Five times a week. (First and Second Terms of third year of Civil, Mining, Mechanical, Electrical and Ceramics Courses.)

7. **Strength of Materials.** Recitations and lectures on the elastic and ultimate resistance of the materials of engineering to stress and their use in structures and machines. Lectures on elementary hydraulics and the flow of water through orifices and pipes over weirs, and in streams, and on measuring the same. Five times a week. (Third Term of third year of same as Course 6.)

8. **Thermodynamics.** Lectures and recitations on the transformation of heat and mechanical energies. Ideal indicator diagrams of steam, air and gas engines; the flow of gases through pipes and orifices. Five times a week. (First Term of fourth year of Courses in Electrical and Mechanical Engineering.)

9. **Prime Movers.** Lectures and recitations on steam and gas engines, turbine water wheels, valve movements and governors; their construction, operation, efficiency and economy. Five times a week. (Second Term of fourth year of Courses in Electrical and Mechanical Engineering.)

LABORATORY FOR METALLURGICAL CHEMISTRY



MINING ENGINEERING LABORATORY—FANS AND COMPRESSOR

10. **Steam Boilers.** Lectures and recitations on steam boilers, furnaces, automatic stokers, gas producers and boiler appliances; their construction, operation, efficiency and economy. Five times a week. (Third Term of fourth year of Courses in Electrical and Mechanical Engineering.)

12. **Experimental Engineering Laboratory.** Twice a week. (First Term of third year of Course in Mechanical Engineering.)

13. The same. Four times a week. (First Term of fourth year of Course in Mechanical Engineering.)

14. The same. Four times a week. (Second Term of fourth year of Course in Mechanical Engineering.)

15. The same. Three times a week. (Third Term of fourth year of Course in Mechanical Engineering.)

16. The same. Four times a week. (Third Term of third year of Course in Electrical Engineering.)

17. The same. Three times a week. (Second Term of fourth year of Course in Civil Engineering.)

Courses 12, 13, 14, 15, 16, 17, 24 and 25, in the Experimental Engineering Laboratory, are arranged to meet the needs of the different students in obtaining experimental practice in the use and calibration of accurate measuring instruments; in testing illuminating and lubricating oils for friction, endurance, and the like; in the calibration and adjustment of gauges and springs; in testing the strength and elasticity of the materials of construction in tension, compression, torsion, flexure, shear and impact, in the flow of liquids and gases; in the use of the steam engine indicator and transmission and absorption dynamometers; in testing of steam separators, injectors, steam pipe coverings; belt, rope and chain gearing; in setting valves and eccentrics; in making efficiency tests of simple and compound, condensing and non-condensing steam engines; of steam boilers and complete power plants; of gas and hot air furnaces; of pulsometer steam and centrifugal pumps; of hydraulic rams and of impulse and turbine water wheels.

18. **Machine Design.** Recitations on Unwin's Machine Design, with lectures on American Practice. Five times a week. (First and Second Terms of fourth year of Courses in Mechanical Engineering.)

20. **Hydraulic Machinery.** Recitations and lectures on pumping machinery. Twice a week. (Third Term of fourth year of Course in Mechanical Engineering.)

21. **Thesis Work.** Five times a week. (Third Term of fourth year of Course in Mechanical Engineering.)

22. **Timber and Masonry.** Lectures on the construction of foundations and structures in timber and masonry. Five times a week. (The last three-fifths of Second Term of third year of Course in Mechanical Engineering.)

23. **Materials of Construction.** Lectures on the materials used in architecture and building construction, and laboratory exercises on their properties. Five times a week. (First Term of second year of Course in Architecture.)

24. **Experimental Engineering Laboratory.** Three times a week. (First and Second Terms. Elective to third year and fourth year engineers.)

25. **Experimental Engineering Laboratory.** Three times a week. (Third Term of fourth year of Course in Civil Engineering.)

METALLURGY AND MINERALOGY

Professor N. W. Lord, Mr. Somermier

The Department of Metallurgy and Mineralogy occupies the eastern part of Chemical Hall. In the basement are the smelting furnaces, the assay laboratory, a room for rough work, and store rooms for supplies. On the first floor is the lecture room of the professor in charge, a laboratory with desks for sixteen students, a store room, a balance room, a private laboratory and an office.

The metallurgical laboratory has all the appliances for the most modern methods of technical analysis as practiced in iron and steel laboratories, including gas analysis. A furnace room in the basement is fitted for gold and silver assaying, with improved muffle and crucible furnaces.

The lecture room in metallurgy has arrangements for projecting photographs of machines, mines, and furnaces, for class illustrations, and there is a large collection of such views. There is a photographic room with blue-printing facilities, where students learn to make copies of the drawings used in illustrating the lectures.

A collection of minerals and rocks with a large set of rock sections is provided for illustrating the mineralogy, as well as sets of blow-pipe apparatus for the students in determinative mineralogy.

2. **Mineralogy.** Lectures arranged so as to be preparatory to Determinative Mineralogy (Course 3). Three times a week. (Third Term of first year Courses in Civil and Mining Engineering, Ceramics and Industrial Arts, and second year of Course in Chemistry.)

3. **Determinative Mineralogy.** Laboratory Course in practical determination of minerals by physical and chemical tests. Each student is furnished with a set of apparatus, and works under an instructor's inspection. Brush's Determinative Mineralogy is used as a manual. Five times a week. (Third Term of third year of Course in Mining Engineering.)

4. **Metallurgy.** A course of lectures upon fuel and its uses, iron and steel, copper, lead, gold and silver, their properties, tests, ores and details of the modes of reduction. The lectures are supplemented by a careful study of references to standard works and journals. Five times a week. (First and Second Terms of third year of Course in Mining and Mechanical Engineering, and First Term of fourth year of Course in Ceramics and Chemistry.)

5. **Metallurgical Laboratory.** Lectures and laboratory work. Laboratory practice in the analysis of iron and steel, fuels and slags, and the assay of lead, copper and zinc ores by wet methods, using approved methods as practiced in technical laboratories of metallurgical works. Course 5 must be preceded by Chem-

ASSAY LABORATORY

istry (7). Five laboratory periods a week. (First, Second and Third Terms, second year of Course in Mining Engineering, third year of Course in Chemistry.)

6. **Assaying.** Laboratory work. Practical work in the assaying of gold, silver and lead ores, by furnace methods. Five laboratory periods a week. (Second Term of third year of Courses in Mining Engineering and Chemistry.)

7. **Metallurgical Construction.** Practice in the designing of furnaces and other metallurgical machinery, including detail drawings and estimates. Three times a week. (Second Term of fourth year of Course in Mining Engineering.)

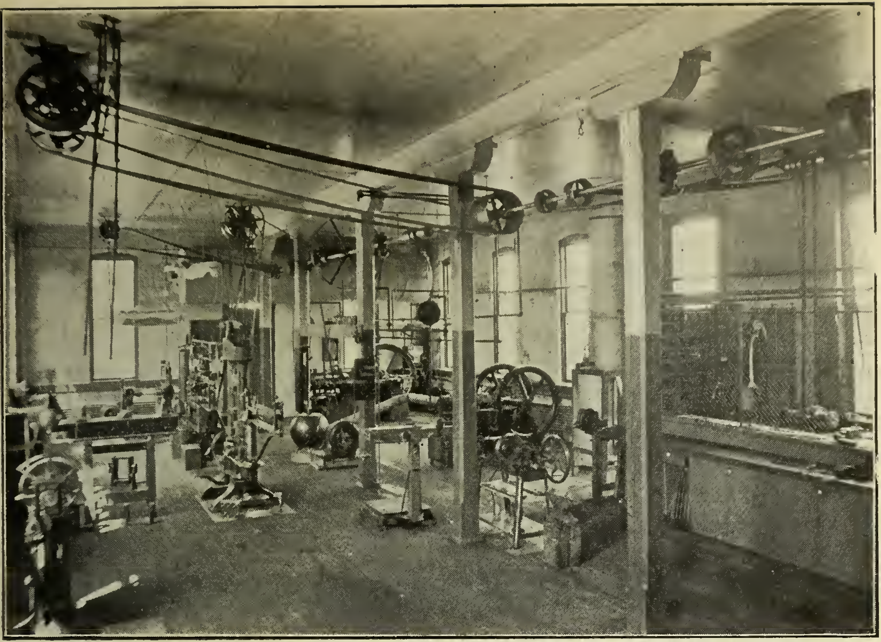
8. **Ore Dressing and Coal Washing.** Lectures. Instruction in the methods of concentrating and enriching ores and fuels by mechanical means. Lectures with reference to standard books and various papers in technical journals. Twice a week. (First Term of fourth year of Course in Mining Engineering.)

9. **Mineral Chemistry.** Lectures upon fire-damp, mine explosions, explosives, boiler waters, poisonous gases, iron ores; iron and steel, their properties and modes of manufacture; coal and coke. Five hours a week. (Third Term of second year of Short Course in Mining.)

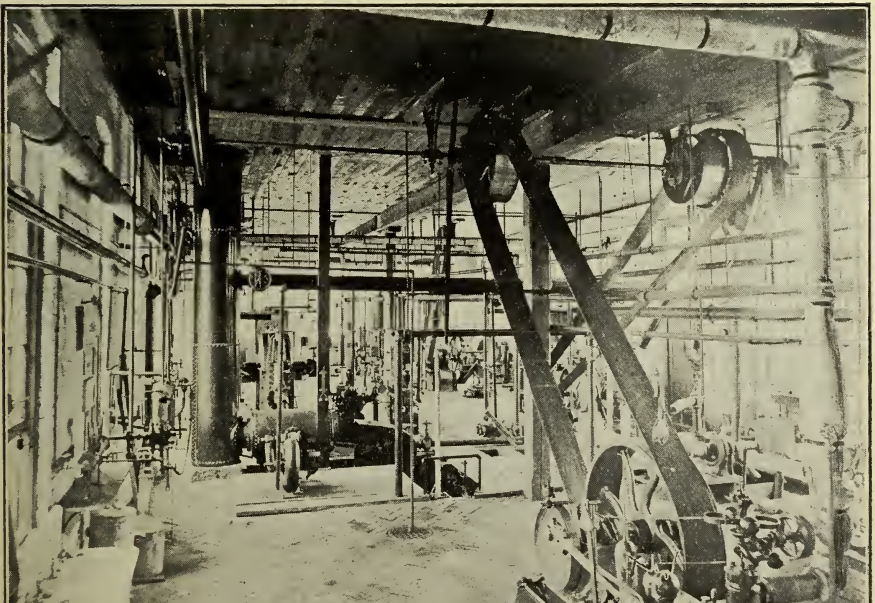
MILITARY SCIENCE AND TACTICS

Lieutenant Martin, U. S. A

1. **Military Drill.** Three times a week through the year.
2. **Tactics.** Lectures and recitations. Twice a week. (Second Term.)
3. **Art of War.** Lectures and recitations. Twice a week. (Second Term.)



EXPERIMENTAL ENGINEERING LABORATORY
GAS ENGINES AND TESTING APPARATUS



EXPERIMENTAL ENGINEERING LABORATORY
STEAM ENGINES AND HYDRAULIC MACHINES

MINE ENGINEERING

Associate Professor Ray

This Department is equipped with all of the latest improved instruments and apparatus used in mine engineering, surveying and the study of mine ventilation. There is a collection of models of mine machinery and supplies, to which additions are being made which are valuable as illustrations. The draughting room is large, well lighted and provided with a desk for each student, where he is personally taught map making and the platting of actual surface and underground surveys; the making of tracings of drawings and how to make blue-prints. He is also taught proper methods of keeping notes and all records necessary to an efficient engineer's office. The students are given practical experience by making actual surveys of coal mines and in working up their notes complete in all of the necessary details. The students are also taught how to make working drawings, plans, estimates and specifications of mining operations and equipment.

The lecture room has arrangements for projecting photographs of machines, mines and mine equipment, for class illustration, and there is a collection of such views. Also a photographic room with blue-printing facilities, where students learn to make copies of the drawings made by themselves and those used in illustrating the lectures.

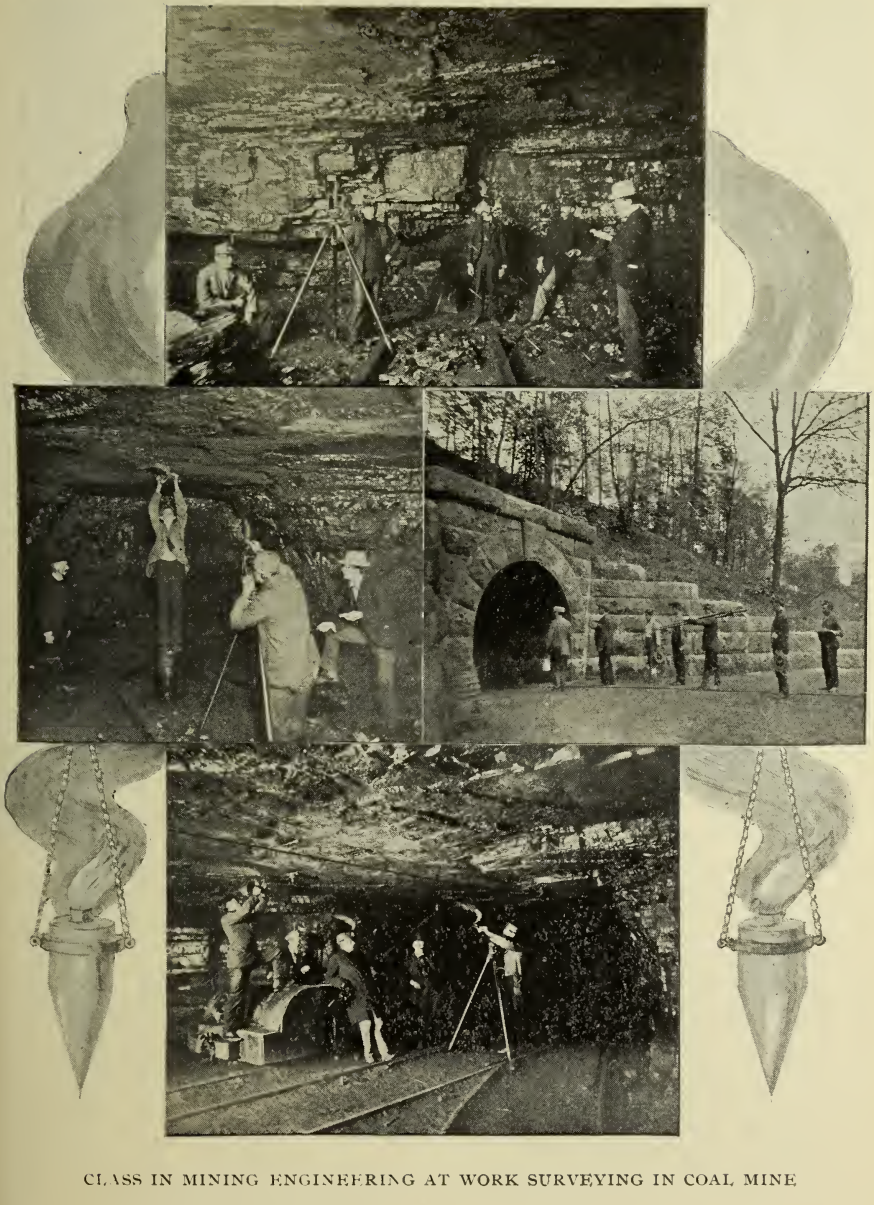
The Mining Engineering Course pays special attention to underground surveying, mapping, timbering, ventilation and other matters relating to safety and speed system and method in extracting coal and other materials.

The coal mines of central Ohio are easily accessible to the University and furnish an extremely valuable field for illustrating the practical systems and methods of mine surveying, systems of mining, timbering, haulage, drainage and ventilation, tipple construction and general arrangement of mining plants.

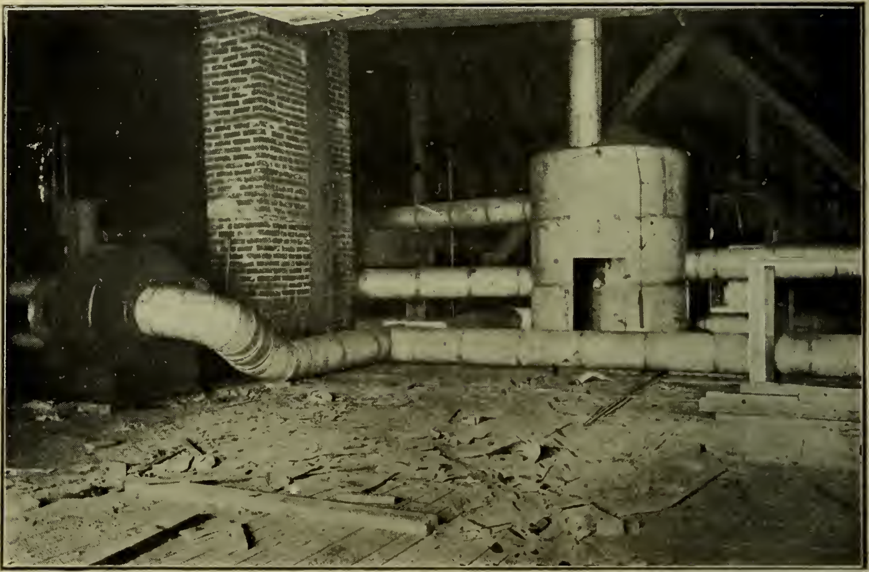
During their course the mining students are required to make frequent trips and to spend sufficient time at the mines in actual work and observation to become familiar with practical mine surveying and the details of mine equipment and management. This work is further supplemented by visits to shops or public works, which afford practical illustrations of Engineering work in the process of construction.

1. **Mine Surveying.** Lectures and field practice. This is similar to Course 4, but more elementary. The same text is used. The students have more practice in the drawing room. Five times a week. (First Term of second year of Short Course in Mining.)

2. **Ventilation and Haulage.** Lectures illustrated by experiments and maps of mines and models when possible, tests by safety lamps and anemometers, and methods of air distribution in coal mines,



CLASS IN MINING ENGINEERING AT WORK SURVEYING IN COAL MINE



MINING ENGINEERING LABORATORY—AIR MEASURING PLANT

Five times a week. (Second Term of second year of Short Course in Mining.)

3. **Mine Operating.** A course of lectures and practical instruction in mine book-keeping and accounts, cost of working, etc., particularly adapted to Ohio coal mining. Five times a week. (Third Term of second year of Short Course in Mining.)
4. **Mine Surveying.** Field practice in the use of instruments for surface and underground surveys. Full notes are taken and maps and plans made in the drawing room. Davies's Surveying, by Van Amringe, is used as a text-book. Five times a week. (First Term of third year of Courses in Mining Engineering and Ceramics.)
5. **Mine Engineering.** Lectures. Mine operating, mining machinery, ventilation, shaft-sinking, working out deposits, etc. Constant reference is required to the standard works and to the leading technical journals, with practice in designing mine plants, draughting and estimates. Five times a week. (First, Second and Third Terms of fourth year of Course in Mining Engineering.)
6. **Plans and Specifications.** Five times a week. (Third Term of fourth year of Course in Mining Engineering.)

PHYSICS

Professor Thomas, Assistant Professor Boyd, Mr. Kester

The Department of Physics occupies the west half of the first two floors and basement of University Hall. The first floor rooms are the principal lecture room, fifty-five by thirty-eight feet; the elementary lecture room; an instrument room; and the office of the Department.

On the second floor are rooms for elementary laboratory work, and a dark room for photographic work, in connection with spectrum and Roentgen-ray apparatus. The lecture room on the first floor is also used in laboratory work. In the basement, provision is made for advanced exercises in electricity, heat, etc. The basement plan on an adjoining page gives a general idea of its arrangenment, and of the character of the work provided for.

The Department has an excellent equipment of apparatus, to which additions are constantly being made. The apparatus includes a large collection of pieces for illustration of the general lecture room work, but is principally chosen for accurate measurement in the laboratory. A set of standards of length, capacity and mass, sent under the act of Congress supplying such sets to the several agricultural colleges, is in the possession of the Department. The pieces are copies of the United States standards made by the Coast Survey at Washington.

Among the principal pieces of apparatus are a dividing machine by Fauth & Co.; chronometers by Parkinson & Frodsham and by Negus, the latter a break-circuit; a chronograph by Fauth & Co.; a Hipp's chronoscope; cathetometers by Salleron and by the Geneva Society, the latter an exceptionally fine instrument; Regnault's apparatus for vapor tension, for expansion of gases and for specific heat; Melloni-Tyndall apparatus for radiant heat; standard thermometers by Baudin and others; Rutherford and Rowland, diffraction gratings; Rowland's spectrum photographs, spectroscopes by Brashear, Browning, Apps and others; Salleron's complete apparatus for projections in polarized light lanterns for projections by the lime light and the arc light; a variety of sound apparatus from Koenig; portable and quadrant electrometers; Kelvin galvanometers of high and low resistance; Weidman, Kohlrausch and other galvanometers; standard resistance coils, with Cavendish laboratory certificate; several sets of resistance coils and bridges; a Kew magnotometer; Kelvin standard balances; Weston ammeters and voltmeters; standards of self-induction standard battery cells; photometric standards and photometers; X-ray apparatus, etc.

Under the laws of Ohio, the professor of Physics is ex-officio State Sealer of Weights and Measures, and all of the standard weights, measures and balances received from the United States government are in the rooms of the Department.

1. **Elementary Physics.** Recitations and experimental lectures. Five times a week. First and Second Terms. Text: Carhart & Chutes' "Elements of Physics." (Required in first year of Short Courses in Mining and Ceramics, and in second year of Short Course in Industrial Arts.)

2. **Mechanics and Heat. Electricity and Magnetism, Sound and Light.** Lectures and recitations. Three times a week. (First, Second and Third Terms of second year in all except the two-year Courses.)

3. **Physics.** Extension of Course 2, with practice in solution of problems. Twice a week. (First, Second and Third Terms of second year of Course in Electrical Engineering.)

4. **Electricity and Magnetism.** Lectures and recitations. Three times a week. (First Term, third year Course in Eelectrical Engineering.)

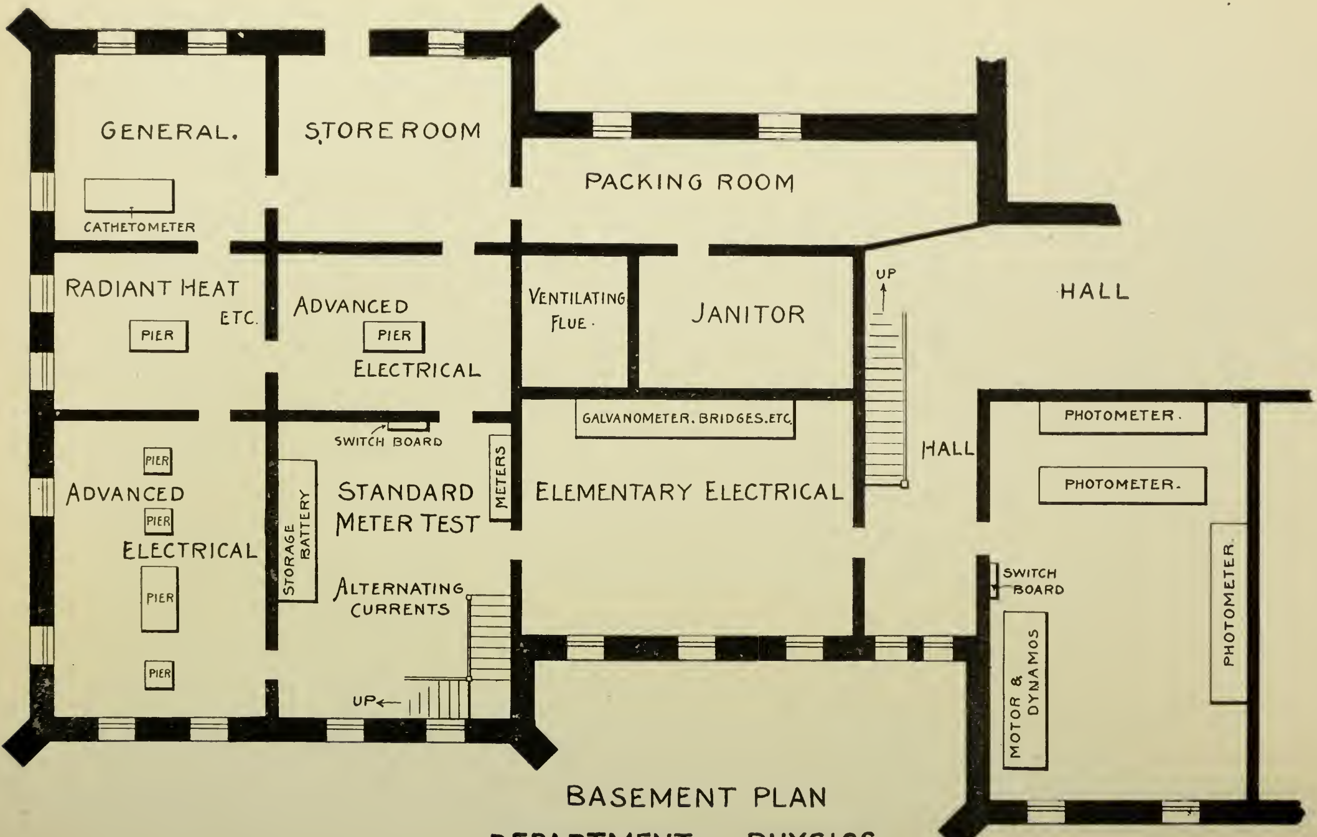
5. **Physical Laboratory.** Elementary manipulation. Length, mass and time measurements. Work in density, elasticity and in heat. Four times a week. (Second and Third Terms of second year of Course in Electrical Engineering.)

6. **Physical Laboratory.** Theory and practice of magnetic and electrical measurement, including the testing and standardizing of instruments; conductivity of conductors; insulations, capacity and resistance of insulated conductors and cables; temperature coefficients; commercial measuring and testing instruments; strength and distribution of magnetic fields, magnetic moments, permeability; work in light, including optical constants; spectroscopy; photometry of gas, electric and other lights. (Three times a week. First Term, and five times a week, Second and Third Terms, third year Course in Electrical Engineering.)

7. **Physical Laboratory.** Course 7 must be preceded by Course 2. (Twice a week, Second Term, three times a week Third Term, second year of Course in Mechanical Engineering.)

9. **Physical Laboratory.** A second year's work in Physical Laboratory. Three times a week, with five hours' credit. Course 9 must be preceded by Course 7. Elective.

The work in the Physical Laboratory begins with exercises in length, mass and time measurements, making use of scales, tapes and bars, micrometer screws, micrometer microscopes, the dividing engine, the cathetometer, the balance, chronometers, chronoscopes, etc. This course is intended to give the student facility in the use of instruments, and knowledge of the theory of their construction and adjustment.



BASEMENT PLAN

DEPARTMENT of PHYSICS.

The determination of various physical constants follows, with elementary exercises in heat, light, electricity and magnetism; after which the student takes up such advanced work as his taste and skill permit. The experimental work is accompanied by instruction in methods and in the discussion of results.

RHETORIC AND ENGLISH LANGUAGE

Professor Denney, Assistant Professor Graves, Assistant Professor Shurter, Assistant Professor McKnight.

5. **Paragraph Writing and Practical Rhetoric.** Themes and exercises. Three times a week. Two and one-half hours' credit. (First, Second and Third Terms of first year in all except two-year Courses.)

3. **Advanced Rhetoric.** Twice a week. (First, Second and Third Terms of second year in Electrical and Mechanical Engineering and Industrial Arts, and third year of Courses in Civil, Mining, Ceramics and Chemistry.)

4. **Advanced Composition.** Twice a week. (First, Second and Third Terms of second year. Offered as an elective study in Civil, Mining, Mechanical and Electrical, and Ceramics Courses.)

Note—In addition to the above subjects enumerated in the preceding pages (36 to 86), which form the required work of the Engineering Courses, there are many other subjects, which may be elected in some of the courses of this College. For descriptions of these, consult the general catalogue of the University.

THE CAMPUS IN WINTER

THE UNIVERSITY POWER PLANT

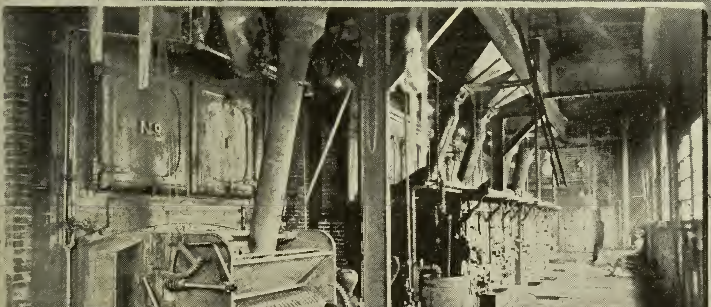
The buildings of the power plant were completed in 1896, and, with their contents, form a model plant. The boiler room is 38 by 100 feet, and is equipped with five 150 H. P. boilers, with Babcock and Wilcox chain grates and Murphy automatic stoker. There are also coal and ash conveyors for the whole plant. At one end of the boiler room is the coal room, and at the other the pit for the hot well, from which also runs the tunnel (of which there is about three-fourths mile) to the buildings of the University, carrying heat, gas and water-pipes, and power, light and other wires.

Near the boiler house is the power house, 40 by 60 feet. The power generating plant consists of a 70 Horse Power McEwen compound engine, belted to a 60 kilowatt 2-phase Westinghouse Alternator, and a 200 Horse Power Watertown Compound, direct connected to a 125 kilowatt 2-phase generator. These occupy the main floor, together with a complete marble switchboard, with ammeters, voltmeters, wattmeters, static ground detectors, etc. A ten-ton traveling crane is available for handling the machinery in this room.

In the basement are condensers, which get their water from a large cooling reservoir at the side of the building. Here also are the transformers that convert the current to be used in the motors scattered over the campus, from 1100 volts, at which it is generated, to 400 volts, at which it is transmitted.

There are installed on the campus over eighteen hundred incandescent lamps, twenty-four arc lamps and about 250 H. P. in motors. The electric plant is for the most part of the Westinghouse system. The buildings are of brick. Nearly all of the University buildings are heated by steam from this plant. The total cost of the plant for generation of power, light and heat, and for its transmission to the buildings, has been something over $100,000.

The views on the opposite page show the interiors of the engine house and boiler house above and below and in the center, a view of the whole plant, looking west across the reservoir.



ENGINE ROOM

POWER PLANT—FROM EAST

BOILER ROOM

ADMISSION, ATTENDANCE AND GRADUATION

The entrance examinations for 1899 will be held on Monday, Tuesday and Wednesday, September 11, 12 and 13.

Applicants for admission to the College of Engineering must be at least seventeen years of age, and must be provided with credentials of scholarship from their last instructors, or from the last institution with which they have been connected, and with certificate of good moral character.

There are three modes of admission to the University:

1. Certificates of the preparatory departments of Colleges of approved standing and of Normal schools in Ohio are accepted, if found satisfactory, in lieu of examination for preparatory studies, under the following conditions:

Each certificate must contain a detailed statement of the studies pursued, the text-books used, the amount of work done in each study, the amount of time devoted to it, the date of the examination, and the applicant's rank or standing in it. A copy of the course of study should accompany the certificate; and both should be sent to the University not later than the first of September. The University cannot promise this recognition to certificates presented during the entrance week.

Blank certificates will be furnished on application.

Applicants for admission who come from other Colleges or Universities are required to bring certificates of honorable dismission.

Teachers' certificates (in force) will be accepted at their face value.

2. From time to time the University approves the courses of study in certain High Schools of the State; and the graduates of these High Schools are admitted on presentation of cards issued to them at their graduation through their principals.

3. All other applicants are subject to examination on the groups of study mentioned below.

Full equivalents for the text-books named will be accepted.

REQUIREMENTS FOR ADMISSION TO THE FOUR-YEAR COURSES, AND TO THE COURSE IN ARCHITECTURE.

The following are the requirements:

1. *Arithmetic, Descriptive and Physical Geography, English Grammar and United States History.*

2. *English*—(a)—Composition and Rhetoric. Each applicant will be tested as to his ability to write clear and correct English. The test will be writing of two essays of about two hundred words each. The first essay will be upon a subject drawn from the candidate's ob-

servation or experience; as "A description of my native town," "The most remarkable person I ever met," "My reasons for seeking a University education." The second essay will be upon a subject drawn from a list of classics which will be furnished upon application.

(b) English Classics—Questions will be set for the purpose of testing the applicant's knowledge of the subject matter, form and substance, of the following books; with the plot, purpose, literary style and peculiarities, incidents, and characters of which the applicant should make himself thoroughly familiar:

1899. Chaucer's The Knight's Tale, or Dryden's Palamon and Arcite; Milton's Paradise Lost, Books I and II; Pope's Iliad, Books I, VI, XXII and XXIV; The Sir Roger de Coverly Papers in The Spectator, Goldsmith's The Vicar of Wakefield, Scott's Ivanhoe, Cooper's The Last of the Mohicans, Lowell's The Vision of Sir Launfal, Hawthorne's The House of Seven Gables.

1900. Chaucer's The Knight's Tale, or Dryden's Palamon and Arcite; Milton's Paradise Lost, Books I and II; Pope's Iliad, Books I, IV, XXII and XXIV; The Sir Roger de Coverly Papers in The Spectator, Goldsmith's The Vicar of Wakefield, Scott's Ivanhoe, Cooper's The Last of the Mohicans, Macauley's Essay on Milton, Burke's Conciliation with the Colonies.

3. *Algebra*—Wentworth's, White's, or Well's Elements, complete.

4. *Civil Government*—Fiske or Thorpe preferred.

5. *Geometry, Plane and Solid*—Venable, Wentworth, White, or Wells.

6. *History*—Myer's General History.

7. *Latin*—Pronunciation (the Roman method); Grammar (an exact knowledge of the inflections is essential); Cæsar, the first four books of the De Bello Gallico.

Or *French*—The whole subject of French Grammar. Applicants will be expected to read at sight easy French and to translate correctly into French, simple English sentences. Two years ought to be given to this study, the first year being spent mainly on the Grammar and the second devoted to reading good modern French. The texts read should be chiefly narrative and conversational prose; modern, rather than classic, dramas should be read.

Or *German*—Joynes-Messiner's German Grammar, complete; Joyne's German Reader, complete; Hauff's Liechtenstein, Lessing's Minna von Barnhelm, Huss's Sessenheim and Buchheim's Goethe's Dichtung und Wahrheit.

For the year 1899-1900 the German or French required for admission may be begun at the University, but without University credits.

8. *Physics*—Gage, Carhart and Chute, Avery or Appleton, complete.

An applicant for admission who may be somewhat in arrears in any given subject, will find opportunity to make up this work in the Columbus High Schools, which are fully accredited by the University.

No student will be admitted to the College of Engineering who is in arrears more than fifteen hours, of which not more than five hours may be in Mathematics.

REQUIREMENTS FOR ADMISSION TO THE SHORT COURSES IN MINING, IN CLAY-WORKING AND IN INDUSTRIAL ARTS.

Applicants must not be less than sixteen years of age, and unless they are over twenty-one years of age must pass an examination in Arithmetic, Geography, Grammar and Orthography, or bring High School or other certificates for these branches.

Applicants who are over twenty-one years of age are admitted without examination.

ADMISSION TO SPECIAL STUDIES.

Students who desire to pursue special lines of work in the University, and do not desire to become candidates for degrees, will be admitted on the following conditions:

1. The regular entrance requirements must be satisfied.

But applicants who are not less than eighteen years of age, after obtaining credit for elementary or "grade" work, and for such other subjects as may be necessary to qualify them for the classes that they wish to enter, may, on the presentation of satisfactory reasons, be admitted by the Faculty to any class in the College; provided, that if any student who has been admitted on these conditions afterwards becomes a candidate for a degree, he shall take the omitted entrance examinations at least twelve months before the degree is conferred.

2. On entering the College, students desiring to pursue special work are required to lay before the Faculty, for approval or modification, a written statement of the end they have in view, the studies proposed for the attainment of that end, and the probable period of attendance. Such students will be held as strictly to their accepted schemes of work as are the regular undergraduates to their courses of study.

3. *Permission to enter as special undergraduates will be refused to all who fail to give satisfactory evidence of definiteness of purpose and will be withdrawn whenever the conditions on which it was granted cease to exist.*

ADMISSION TO ADVANCED STANDING.

1. Applicants who do not come from some other University or College must first obtain admission in the manner already described. They will then be examined on the undergraduate studies for which they ask credits.

2. Applicants who come from the collegiate department of an approved College, and who bring explicit and official certificates describing their course of study and scholarship, and also certificates of honorable dismission, will be admitted without examination, except such as may be necessary to determine what credit they are to receive here for work done in the College from which they come.

REGISTRATION

All students are required to register and pay their term fees on or before the first day of each term, between the hours of 8:00 a. m. and 12 m., or between 1:00 and 4:00 p. m., central standard time.

Former students who fail to register as above will be charged one dollar in addition to the usual incidental fee, for the first day of delinquency, and fifty cents additional for each subsequent day.

No candidate for graduation will be permitted to register for the second term of his graduating year, except upon presentation to the Bursar of the President's certificate that his thesis subject has been announced and approved.

AMOUNT OF WORK

No student is permitted to take less than fifteen credit hours a week of any sort of work, except by special permission, and no student will be permitted to take more than the regular work of the class to which he belongs, who has not passed all his work for the preceding term. A credit hour means one hour class room work in lecture, recitation or quiz, or two hours of laboratory work.

ELECTIVE STUDIES

All elections of work in continuous studies, when once made, are understood to be made for the entire collegiate year.

The right is reserved to each professor to withdraw the offer of any elective study when it is not chosen by at least four persons.

EXAMINATION AND STANDINGS

At the close of any term a student failing to pass in two-thirds of his work will be considered on probation; and a second similar failure will forfeit his connection with the University.

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of this study must lie within the field of the degree sought. The subject must be announced to the President of the University (dependent upon the approval of the head of the Department), not later than the beginning of the second term of the fourth year; and the completed thesis must be presented in duplicate, on standard paper of certain size and quality, typewritten, bound, and titled, not later than the second Saturday before Commencement Day.

DEGREES

The degree of Civil Engineer is conferred on those who have completed the Course in Civil Engineering; that of Engineer of Mines on those who have completed the Course in Mining Engineering; that of Mechanical Engineer on those who have completed the Course in Mechanical Engineering; that of Mechanical Engineer in Electrical Engineering on those who have completed the Course in Electrical Engineering; that of Engineer of Mines in Ceramics on those who have completed the Course in Ceramics.

The degree of Bachelor of Science in Industrial Arts is conferred on students who have completed the Course in Industrial Arts; that of Bachelor of Science in Chemistry or Metallurgy on those who have completed the Course in Chemistry.

Except by unanaimous consent of the Faculty, no candidate for graduation will be recommended for a degree whose record is not in all respects complete by the Friday evening previous to the Commencement Day on which he seeks the degree.

EXPENSES

FEES

Each student is required to pay an incidental fee of fifteen dollars a year, and the usual fees for the expenses of laboratory work. Tuition is free.

Laboratory Fees.—Students in the laboratories and shops are required to pay fees to cover, in part, the cost of the material consumed, and the deterioration of the expensive instruments used by them. The fees charged per term in the laboratories mentioned below are as follows:

Ceramics, 4, 5, 6, 9, 10, 11, 12	$5 00
Drawing, 7	2 00
Electrical Engineering, 4 and 5 (4 or 5 hrs.), $7; (3 hrs. or less)	5 00
Gymnasium	1 00
Shop Work, 4 hrs. or less	5 00
Shop Work, 5 hrs. or more	7 00
Mechanical Engineering, 12, 13, 14, 15, 16, 17	5 00
Physics, 5, 6, 7, 9 (3 hrs.), $5; (over 3 hrs.)	7 00

In the laboratories of the Department of Chemistry, Ceramics and Metallurgy, each student is required at the beginning of each term to pay a fixed charge of one dollar and fifty cents for gas and water. He is also required to buy his own supplies, which may be obtained at the store-room in Chemical Hall. With reasonable care, this expense need not exceed $5.00 per term.

All term dues must be paid at the opening of each term as a condition of admission to classes.

A fee of five dollars to cover expenses of graduation, diplomas, etc., is required of each person receiving one of the ordinary degrees from the University, and this fee must be paid before the degree is conferred.

OTHER EXPENSES

There are two dormitories on the University grounds for the use of students. Each occupant is charged by the University a rent of one dollar and fifty cents a term.

The South Dormitory affords unfurnished rooms to such students as desire to board themselves, and thus to reduce their expenses to a minimum. The expense of living in this way falls below two dollars per week. Applications for rooms should be made to the President of the University.

The North Dormitory will accommodate more than sixty students. Board, furnished rooms, fuel, light and washing are, at present prices, supplied for about three dollars and twenty-five cents a week. Students will be admitted on special recommendation to the President of the University.

Boarding clubs are also formed in the neighborhood of the University. Furnished rooms are rented at seventy-five cents to one dollar a week for each student, and the cost of board is two dollars to three dollars a week.

Board, with furnished rooms, can be obtained in private families, within convenient distances of the University, at rates varying from four dollars to five dollars a week. The ruling rate may be taken as four dollars.

The uniform with which the members of the battalion are required to provide themselves costs about fourteen dollars. It is quiet in pattern, and is designed to be worn daily in place of civilian dress.

The expenses of a student in this College for a year may be estimated as follows, excluding clothing (except uniform) and traveling expenses:

	Low.	Average.	High.
Incidental fees	$15 00	$15 00	$15 00
Laboratory fees	15 00	15 00	54 00
Books and stationery	15 00	25 00	40 00
Room	4 50	37 00	75 00
Furniture	10 00	....	....
Board	70 00	110 00	150 00
Uniform	14 00	14 00	14 00
	$143 50	$216 00	$348 00

The second and third estimates for room include light, fuel and care. The third estimate is for a room occupied by a single student. The requirements for laboratory fees and books depend upon the course of study pursued.

SELF-SUPPORT

There is a large amount of work upon the University farm and in the shops and laboratories assigned to students, preference being given to those who are studying Agriculture or one of the Engineering Courses. But the University cannot promise work to all applicants. Many students find work in private families, in offices, and in various occupations, by means of which they defray at least a portion of their expenses. A person of ability and energy, who is master of a trade, or who can do good work of any kind, can generally find remunerative employment. It has seldom been known that any student of ordinary energy and industry was obliged to leave the University because of a lack of money for necessary expenses, after having been sixty days on the ground—or long enough to inform himself as to the opportunities for securing employment. An employment bureau is maintained at the University, where the names of those seeking work and of those desiring workers are recorded.

ENROLLMENT

1898--1899

Graduate students	6
Four Year Courses	300
Course in Architecture	9
Short Course in Mining	18
Short Course in Ceramics	10
Short Course in Industrial Arts	1
Total	344

GRADUATE STUDENTS

Hale, Frederick James, M. E.	Mogadore.
Hewitt, Strafford Reeves, M. E. in E. E.	Columbus.
Judd, Horace, M. E., M. Sc.	S. Hadley Falls, Mass.
Krumm, Louis Ralph, M. E. in E. E.	Columbus.
McIntire, Alfred Heber, M. E. in E. E.	Mt. Vernon.
Snively, Harry H., B. A.	Columbus.

UNDER GRADUATES

A

Name.	*Course.*	*Address.*
Abbott, Donald Coleman	E. E.	Columbus.
Albery, Herman William	C. E.	Columbus.
Alford, Arthur Milton	M. E	Windham.
Ames, Holiday	C. E.	Ashland.
Armstrong, William Wirt	M. E	Woodsfield.
Arnold, Charles H	M. E	New London.
Arons, Richard Demront	E. E.	Columbus.
Atkinson, Warren	M. E	Greenville, S. C.

B

Bailey, Edward Harding	M. E	Damascus.
Bailey, Ervin George	E. E.	Damascus.
Balcomb, Charles	Chemistry.	North Ridgeville.
Balz, Ernest	C. E.	Columbus.
Balz, Louis Christian Frederick	C. E.	Columbus.
Barringer, John Martin	Chemistry.	Washington, D. C.
Barringer, Lawrence Eugene	Ceramics	Washington, D. C.
Barry, William John	C. E.	New Straitsville.
Bauer, Louis E	E. E.	Springfield.
Baughman, Norman	E. E.	Roseville.
Baumann, John C. B	Mining S.	Gütersloh, Germany.
Bauroth, Walter John	M. E	Springfield.
Beach, Charles Wesley	E. E.	Geneva.
Beauchamp, Earl G	M. E	Hamilton.
Bedwell, Charles Francis	E. E.	Columbus.
Berkey, Leslie Reese	Ceramics.	Bolivar, Pa.

Name.	*Course.*	*Address.*
Berndroth, Geary Martin	E. E.	Geneva.
Bischoff, John Wallace	E. M	Elk Garden, W. Va.
Billingsley, Robert Wallace	M. E	Lisbon.
Bleininger, Albert Victor	Ceramics	Columbus.
Blose, Miller L.	E. E.	Urbana.
Boehme, Adolph Joe	M. E	Youngstown.
Bogardus, Evert	M. E	Mt. Vernon.
Bohn, Oscar Herman	Mining S.	Cleveland.
Borger, Charles S.	M. E	Columbus.
Bostwick, Oliver Newton	E. E.	Mt. Sterling.
Bott, George Robert	M. E	Columbus.
Bowden, Harry William	C. E.	Minerva.
Bowditch, John Henry	C. E.	Tracy.
Bowdle, George Frederick	M. E	Piqua.
Bownocker, Francis Marion	Ind. Arts S.	Columbus.
Branum, Frank C.	E. E.	Bridgeport.
Britton, Lloyd C.	C. E.	Williamsburg.
Brooks, Herbert Barton	E. E.	Piqua.
Brooks, Wheeler Athens	E. E.	Ironton.
Brophy, John Francis	E. M	Elk Garden, W. Va.
Butler, John Francis	Ceramics S.	Austin, Texas.
Bygate, Harry Goldsmith	M. E	Steubenville.

C

Name.	*Course.*	*Address.*
Cain, John	Chemistry	Urbana.
Calkins, Arda Hall	Chemistry	Columbus.
Cameron, Harry Ezra	C. E.	Lisbon.
Campbell, Rollo Wilbur	E. M	Fostoria.
Campbell, Willis Elmer	C. E.	Fostoria.
Cannan, William	Ceramics S.	Plymouth.
Cappel, William Frederick	M. E	Dayton.
Caskey, George Alexander	M. E	Columbus.
Cavanaugh, Andrew Francis	M. E	Dayton.
Cavin, Frank Thomas	E. E.	Spencer.
Chaffin, Wendel Wilson	C. E.	Dayton.
Chandler, Homer Payne	E. E.	Columbus.
Chandler, Frederick	Ind. Arts	New Comerstown.
Childs, Maxwell	E. E.	Troy.
Clark, Clarence Julian	C. E.	Wilberforce.
Clarke, James Ulrick	E. E.	Lancaster.
Closson, Clayton Drew		Galena.
Coleman, Albert C.	Ind. Arts	Windsor.
Comstock, Aytch Clay	E. E.	Nelsonville.
Connors, John Leo	Mining S.	Columbus.

Name.	*Course.*	*Address.*
Conrad, Verne Louis	C. E.	Columbus.
Cooke, Royal Alston	E. E.	Wyoming.
Cooley, James Riddile	E. E.	Nelsonville.
Cornell, Charles Brown	M. E	Columbus.
Cory, Mark Dee	C. E.	DeGraff.
Cosley, Harvey Harter	C. E.	Troy.
Cox, Ross Stilwill	M. E	Lewisburg.
Crabill, Pearl P	M. E	Springfield.
Crable, Arthur	C. E.	Columbus.
Crable, George	M. E	Columbus.
Crumley, Cloise Hamilton	E. E.	Lancaster.
Cryder, Howard Michael	Arch	Chillicothe.
Curtis, Leigh Goodrich	C. E.	Hamilton.

D

Damon, Owen H	C. E	Hinckley.
Dann, Walter M	E. E.	Columbus.
Davis, Charles L	E. E.	West Alexandria.
Davis, George A	Ceramics S.	Shawnee.
Davis, Thomas John	Ceramics S.	Girard.
Denny, Charles Wampler	E. E.	Middletown.
DeWolf, Roger Dennison	E. E.	Madison, Ga.
Diehl, Joseph A	Arch	Defiance.
Dierdorff, Percy Cyrus	M. E	Columbus.
Dill, Raymond	E. E.	Columbus.
Dobyus, Harvey Britton	E. E.	Columbus.
Dole, Parr H	M. E	Columbus.
Doty. Charles Wilgerson		Hanging Rock.
Drummond, William George	M. E	Cleveland.
Duke, Carl Lewis	E. E.	Ridgeville.
Dunlop, Robert Rowse	E. E.	Columbus.

E

Elliott, Emmett Foster	Arch	Chester Hill.
Elsner, Richard E	C. E.	Newark.
Eno, Imle L	E. E.	Pomona, Cal.
Erdmann, William	Ind. Arts	Chillicothe.
Espy, Frank		Kenton.
Evans, Charles Hopkins	Mining S.	Evanston.

F

Falkenbach, Schatz	Chemistry	Columbus.
Ferguson, Morse Burton	Ind. Arts	Hanover.

Name.	*Course.*	*Address.*
Ferry, Ray W.	E. E.	Leon.
Fickes, Walter M.	Ceramics	Steubenville.
Flory, Charles Henry	E. E.	Arcanum.
Follett, George Alfred	C. E.	Columbus.
Ford, Nile Otis	E. M	Wheeling, W. Va.
Fornof, Carl William	M. E	Columbus.
Foster, George C.	E. M	Schooley.
Fouts, Edgar W.	E. E.	Piqua.
Frame, Rollo St. Clair	C. E.	Washington.
Frankenburg, George T.	M. E	Columbus.
Frankenburg, John Theodore	E. E.	Columbus.
Frechtling, Arthur George	M. E	Hamilton.
Freer, Will Davis	E. E.	Cortland.
Friedland, Francis William	Mining S.	Coalton.
Frost, George Winfield	M. E	Columbus.

G

Gamper, Herman	M. E	Columbus.
Gates, William Paul	Ceramics	Hinsdale, Ill.
George, Robert G.	E. M	Piqua.
Geren, Arthur G.	Mining S.	Columbus.
Geren, Harry Ogden	E. E.	Columbus.
Gilchrist, Edward Luce	E. E.	Ashtabula.
Gleichauf, Frank S.	Arch	Newark.
Gottwald, Christian	E. E.	Defiance.
Graham, Frank	E. M	Columbus.
Graham, Harry	E. M	Columbus.
Gray, Thomas M.	M. E	Pittsburg, Pa.
Green, Homer Stuart	E. E.	Raymond.
Green, Joseph Walter	E. E.	Dayton.

H

Hager, Leroy William	C. E.	Piqua.
Hambleton, Charles Reverdy	E. E.	Hooksburg.
Hammond, John Miller	C. E.	Columbus.
Hance, Harry Thomas	Chemistry	Columbus.
Hapgood, Eugene Palmer	E. E.	Sabina.
Hardy, Paul	E. M	Columbus.
Harkins, Robert Rusk	M. E	Columbus.
Harmer, Frederick Sturges	Mining S.	Columbus.
Harper, Ellahue A.		Columbus.
Harrigan, Archer	Mining S.	Newcastle, Pa.
Harris, Emmet	E. E.	DeGraff.

Name.	*Course.*	*Address.*
Harrop, Carl	C. E.	Columbus.
Hayman, Will Clayton	E. E.	Holgate.
Hedges, Benson Rice	M. E	Columbus.
Herms, Albert Edward		Columbus.
Herrick, Hobert C.	M. E	Wellington.
Herrick, Nellie		Columbus.
Hershey, Arthur	Ind. Arts	Columbus.
Hertner, John Henry	E. E.	Dayton.
Higgs, Howard Clyde	E. E.	Newark.
Hill, Harry Earl	C. E.	Richwood.
Hirabayashi, Seikichi		Nagoya, Japan.
Hirst, Harry	M. E	Midvale.
Hitch, James Frank	C. E.	Batavia.
Halbrook, George Frederick	E. M	Bucyrus.
Hord, Peyton Robert	E. E.	Marion.
Huddleson, Frank	M. E	Columbus.
Hull, Walter Austin	E. E.	Orangeville.
Hunter, Madone Carington	E. E	Norwich.
Huntington, Arthur	M. E	South Charleston.

I

Ittner, Warren Wayne	Ceramics S.	St. Louis, Mo.

J

Jacobs, Ronald	Ind. Arts	Columbus.
James, Frank Richard	E. M	Columbus.
Jayne, Walter G.	E. E.	Springfield.
Johnson, Earl G.	E. E.	Plants.
Johnson, Walter A.	M. E	Columbus.
Johnston, Howard Charles	M. E	Rushsylvania.
Jones, Howard Martin	E. E.	Marysville.
Jones, Herbert I.		Granville.

K

Kanmacher, Samuel Houston	E. E.	Columbus.
Keating, Harvey Thomas	C. E.	Columbus.
Keller, Daniel Casteel	E. E.	Washington C. H.
Kern, William Frederick	Chemistry	Bellaire.
Kettering, Charles Franklin	E. E.	Loudonville.
Kettler, Frank Christian	C. E.	New Bremen.
King, Francis Emmet	Mining S.	Leisenring, Pa.
King, Herbert Sumner	C. E.	Medina.
Kinnear, Harry Baldwin	E. E.	Mt. Sterling.

Name.	*Course.*	*Address.*
Kinnison, Ernest Eugene	C. E.	Jackson.
Kirker, Gaylord B.	Mining S.	Catlettsburg, Ky.
Knieling, Charles August	E. E.	Willoughby.
Knight, William Abner	M. E	Columbus.
Knoderer, Homer Grey	E. E.	Columbus.
Knouff, Oliver Morton	C. E.	Caldwell.
Knox, Frank S.	E. M	Columbus.
Krause, Wilbur F.	M. E	Columbus.
Krunm,, Thomas Zettler	C. E.	Columbus.
L		
Laiblin, Garfield	M. E	Canton.
Lamb, Whitney Earl	E. E.	Commercial Point.
Lampert, John Martin	M. E	Xenia.
Lee, Corliss Edgar	E. E.	Pugh Postoffice.
Leibold, Carl Peter	E. E.	Columbus.
Leinbaugh, George Gorden	M. E	Bellevue.
Leith, Harry H.	C. E.	Wellsville.
Lesh, John Howard	M. E	Louisville.
Lied, Ernest Mitchell	E. E.	Columbus.
Linebaugh, Jesse Joseph	E. E.	Pleasant Corners.
Linhart, Frank Clement	C. E.	Broughton, Pa.
Linville, Clarence Philander	Chemistry	Urbana.
Lockwood, Howard Thomas	C. E.	Batavia.
Lontz, Harley C.	Mining S.	South Bend, Ind.
Lyon, Arthur Hollingshead	M. E	Wauseon.
M		
Marckworth, Otto Stanley		Cincinnati.
Marietta, Harry Riefsnyder	E. E.	Dayton.
Marsh, Charles Lawrence	C. E.	Urbana.
Marshall, Willard Beverly	E. E.	Piqua.
Martin, John D., Jr.	M. E	New Straitsville.
Mason, John T.		Columbus.
Mason, Charles Filmore	E. E.	Columbus.
McEowen, Hugh Ellsworth		Greenville.
McFarland, Horace M.	E. M	Columbus.
McHugh, Francis	Mining S.	Carrollton, Pa.
McIntosh, Roscoe Everitt	E. E.	Ravenna.
McKeon, Robert Dale	C. E.	Arcanum.
McKinney, Eearl B.	Arch	Columbus.
Melick, Neal Albert	C. E.	Columbus.
Miller, Albert Arthur	E. E.	Zanesville.

Name.	*Course.*	*Address.*
Miller, Charles Emmit	Arch	Spencer.
Miller, John Franklin	E. E	Columbus.
Miller, Ralph Charles	E. E	Zanesville.
Monsarrat, Charles R	M. E	Columbus.
Morlan, Wilbert	M. E	Rogers.
Morris, Willard Bernard	M. E	Columbus.
Morris, William Blaine	M. E	Massillon.
Morris, Robert Hamilton	E. M	Columbus.
Myers, Albert B	E. M	Columbus.
Myers, Fred	C. E	Louisville.

N

Needham, Harry Smithson	M. E	Columbus.
Nicholson, Charles Marion	E. E	Columbus.
Nidy, Herbert C	E. E	Greentown.
Nold, John H	E. M	Columbiana.
Nurian, Kerson	M. E	Philopolis Bulgaria.

O

Oakes, James	Mining S.	Jackson Center, Pa.
Ogbin, Clinton Vanneman	C. E	Salem, N. J.
Osborn, Liphe Andrews	M. E	Columbus.

P

Pabodie, Robert J	M. E	Wyoming.
Panter, Thomas Alfred	E. E.	Niagara Falls, N. Y.
Parkin, William Z	M. E	Columbus.
Parrett, Benjamin Creame	Chemistry	Washington C. H.
Patterson, Arthur Law	E. E	China Grove, N. C.
Peck, Francis J		Yellowbud.
Peck, Louis Tucker	Ind. Arts	Staunton, Va.
Peppel, Samuel Vernon	B. Sc. Chem.	Leetonia.
Peterson, John William	Arch	Port Clinton.
Phillips, William Merriam	E. E.	Columbus.
Pierce, Robert Clark	C. E	Tallmadge.
Post, Malcolm P	Ceramics S.	St. Louis, Mo.
Poto, Frank B	Chemistry	Alliance.
Potts, Royal Warren		Columbus.
Pratt, Fred Kellogg	C. E	New Philadelphia.
Purdy, Ross C	Ceramics S.	Buffalo, N. Y.

R

Name.	*Course.*	*Address.*
Ransom, Ralph P.	M. E.	Mt. Vernon.
Rawson, Levi	C. E.	Lisbon.
Reynolds, Carl		Columbus.
Riddle, Carlton	M. E.	Columbus.
Riebel, Leroy Clemens	Arch	Columbus.
Rightmire, Robert Elwood	M. E.	Wheelersburg.
Robbins, Edwin Thurston		Columbus.
Rogers, Rutherford Hayes	E. E.	Columbus.
Roth, Clyde Ervin	E. E.	Tallmadge.
Roy, Charles Foster	E. M.	Glenroy.
Ryland, Paul Dillen	C. E.	Columbus.

S

Sanderson, Clarence Herbert	E. E.	Logan.
Sanderson, Ray Rochester	E. E.	Washington C. H.
Saxbee, Harry Moody	E. E.	Urbana.
Sayers, Delbert Bancroft	E. E.	Marits.
Schaeffer, Arthur	E. M.	Bucyrus.
Schaff, Harry M.	E. E.	Columbus.
Schloctermeyer, Carl Fred	E. E.	Cincinnati.
Schoenlaub, Thomas Jacob	C. E.	Marion.
Schatt, Alvin Christian	E. E.	Massillon.
Schreiber, George Ernest	E. E.	Ironton.
Schreiber, John Martin	E. E.	Ironton.
Schwab, Frank Wilbert	Chemistry	New Philadelphia.
Senter, Herbert Pike	C. E.	Columbus.
Sharp, John McDowell	C. E.	Columbus.
Shaw, Lucian	C. E.	West Lafayette.
Sheal, Leander	Chemistry	Steubenville.
Shepherd, Charles William	C. E.	Huron.
Sherman, John K.	C. E.	Columbus.
Sherwood, Frank Porter	E. E.	Ashtabula.
Shigley, Clarence Mason		Jamestown.
Shumate, Frank Douglass	E. E.	Urbana.
Sigrist, Charles Ferdinand	Mining S.	Congress.
Simcoe, George	Ceramics S.	Northeast, Md.
Simpson, Henry Jerome	C. E.	Worthington.
Slater, Edward Earl	Mining S.	Nelsonville.
Sleick, Charles Jay	Mining S.	Mishawaka, Ind.
Smith, David William	C. E.	Ashland.
Smith, Harry Ford	M. E.	Lexington.
Smith, John Baker	E. M.	Tiffin.

Name.	*Course.*	*Address.*
Smith, James Oliver	E. E.	Columbus.
Sprague, Clarence M.	C. E.	Summerford.
Sproat, Amasa Delano	E. M.	Chillicothe.
Staley, Marcellus	E. E.	Dayton.
Standish, Miles Walter		Lima.
Starbuck, Karl	E. E.	Barnesville.
Stark, Samuel	Ceramics	Tunkhannock, Pa.
Sterling, James Gilman	M. E.	Springfield.
Stocker, James Arthur	C. E.	Gnadenhutten.
Stone, Carleton Elijah	C. E.	Gallipolis.
Stull, Raymond Thomas	E. E.	Elkland, Pa.
Sweeny, Paul Leslie	E. M.	Columbus.

T

Tanners, Edward Wood	E. E.	Zanesville.
Taylor, George Edwin	E. E.	Marysville.
Thomas, Alfred Redman	Mining S.	Glouster.
Thomas, David A. P.	Arch	Columbus.
Thompson, Ezra John	C. E.	Kirtland.
Thompson, Ira Albert	E. E.	Cleveland.
Trish, George	Mining S.	Nevada.
Tufts, Charles H.	E. M.	Maineville.

V

Van Dyke, Clifford Steele	E. E.	Ansonia.
Voss, Harry Lincoln	Ind. Arts	Colo. Springs, Colo.
Vosskuehler, Joseph Henry	M. E.	Dayton.

W

Waddell, Starling	E. E.	Columbus.
Walker, Robert Harris	E. E.	Cincinnati.
Ward, Vernon C., Jr.	M. E.	Columbus.
Warwick, Martin Luther	Chemistry	Seven Mile.
Weber, Frederick Clarence	Chemistry	Evanston.
Webster, Ellison Godfrey	M. E.	Greenville, S. C.
Wellbaum, Arvy E.	E. E.	Brookville.
Wells, Byron Bliss	E. E.	Ostrander.
Weyrich, Edward	E. E.	Dayton.
Wheaton, Robert John	E. E.	Columbus.
Whetsel, Emerson Jay	C. E.	Jackson.
Whitaker, George Eliot	C. E.	East Liverpool.
Wilcox, Carl Clifford	M. E.	Columbus.
Williams, Alwin Zeliffe		Chicago.

Name.	*Course.*	*Address.*
Williams, Harry Ernest	M. E	Harlem.
Williamson, Homer Davidson	E. E	Monroe.
Wilson, James Somerville	M. E	Columbus.
Wirthwein, Louis Philip	C. E	Columbus.
Wonder, Homer Higgins	Chemistry	Carey.
Woodmansee, Ray David	M. E	Highland.
Worcester, Wolsey G	Ceramics S.	Columbus.

Y

Yost, Lloyd	M. E	Somerset.

Z

Zbinden, Herman Christian	E. E	Toledo.

GRADUATES

Civil Engineers (C. E.)	79
Mechanical Engineers (M. E.)	50
Mining Engineers (E. M.)	44
Electrical Engineers (M. E. in E. E.)	85
Chemistry (B. Sc. in Chemistry)	1
Industrial Arts (B. Sc. in Ind. Arts)	1
Total	260

GRADUATES

A

Ackerman, Eli Osborn, 1884, C. E., 2664 North High street, Columbus, Columbus Street Railway Co.

Ackerman, Fremont, 1883, C. E., Los Angeles, Cal., civil engineer.

Aldrich, Edgar S., 1897, E. E., Westerville, O., secretary and manager Westerville Electric Co.

Alexander, Charles P., 1896, E. E., Letart Falls, teacher in Science.

Alexander, St. Clair, 1893, E. E., Bridgeport.

Alsdorf, Percy Reed, 1896, E. M., Central City, Col., Standard Assay Office.

Alsdorf, Frederick Charles, 1892, E. M., Central City, Col., general manager, DuQuesne Mining Co.

Arnold, Edwin Ebert, 1898, M. E., Pittsburgh, Pa., Westinghouse Machine Co.

Atkinson, Warren, 1899, M. E., Greenville, S. C.

Auld,, James A, 1897, E. E., with D. S. Auld, 76 E. Gay St., Columbus, Ohio.

B

Barcus, Miner, 1897, E. E., Schenectady, N. Y., with General Electric Co.

Barnaby, Charles London, 1898, C. E., Columbus.

Barrows, Harry Holbrooke, 1898, C. E., Lexington, Ky., engineer on Queen & Crescent Line.

Bartholomew, Clyde Stanley, 1896, C. E., Newark, civil engineer, B. & O. Railway.

Beach, David Price, 1895, C. E., Pittsburg, Pa., with Pennsylvania Railroad Co.

Beck, Arthur Andrew, 1893, C. E., Columbus, county surveyor's office.

Belden, Sanford Bonner, 1895, E. M., Chicago, Ill., with Chicago Electric Mining Engineering Co.

Biebel, Herman Matthews, 1896, E. E., Chicago, Ill., electrical engineer with Western Electric Co.

Bischoff, John Wallace, 1899, E. M., Elk Garden, W. Va.

Bissing, William, 1893, M. E. (A. B. Johns Hopkins University), Washington, D. C., examiner in U. S. Patent Office.

Blackburn, Frank H., E. E., Tres Piedras, N. M., superintendent Buckeye Mica Mining Co.

Bloom, J. George, 1889, C. E., Cincinnati, assistant engineer, B. & O. S. W. R'y.

Bower, Jerome G., 1897, M. E., Dennison, P., C., C. & St. L. R. R.

Bradford, Joseph Nelson, 1883, M. E., 54 West Tenth avenue, Columbus, associate professor of Drawing, State University.

Brophy, John Francis, 1899, E. M., Frostburg, Md.

Brown, Frederick W., 1888, E. M., Bellefontaine, superintendent Buckeye Portland Cement Co.

Brown, Newton H., 1893, E. E., instructor in Physics, Delaware State College.

Brumley, David Joseph, 1895, C. E., Evansville, Ind., with L. & N. R'y.

Bruning, Henry Dietrick, 1896, C. E., Pittsburgh, Pa., engineer on P., C., C. & St. L. R'y.

Buckman, Arthur Leslie, 1897, E. E., Toledo, O., Central Telephone Co.

Burns, James Ferguson, 1891, C. E., Evansville, Ind., assistant engineer L. & N. R'y.

Bygate, Harry Goldsmith, M. E., 1899, Steubenville, Ohio.

C

Calkins, George Herbert, 1895, E. E., Schenectady, N. Y., with General Electric Co., testing department.

Capron, Marshall Fremont, 1888, M. E., Kenton, architect.

Carr, Hugh Stanley, 1896, E. E., Sandusky, O., chief electrical engineer, Warren Electric Mfg. Co.

Carroll, Patrick Henry, 1894, E. M., Houtzdale, Pa.

Carson, Samuel King, 1895, E. E., M. D. (Ohio Medical University), New York City.

Catlin, Homer Clark, 1896, C. E., Toledo, Bridge Co.

Cellarius, Frederick Julius, 1888, C. E., Dayton, civil engineer.

Chappell, Walter Evans, 1898, E. E., 1st class electrician, U. S. S. *Chicago*.

Cilley, Raymond, 1896, C. E., Cincinnati.

Coddington, Edwin F., 1896, C. E., 1897, M. Sc., fellow in Astronomy, Lick Observatory, Mount Hamilton, California.

Cole, George Nathan, 1891, E. E., Chicago, Ill., 112 Clark St., mechanical supplies.

Collins, Curtis, 1895, E. E., Boston, Mass., engineer, meter dept., General Electric Co.

Connell, William A., 1886, E. M., Kansas City, Mo., teacher, Manual Training School.

Conway, Hugh Lawrence, 1896, C. E., Springfield.

Cope, Albert N, 1897, E. E., Columbus, O., foreman, Columbus Street Railway Co.

Covell, Vernon Royce, 1895, C. E., Pittsburg, Pa., county engineer's office.

Cunningham, Edward Walter, 1894, C. E., Chicago, United States Engineer's office.

Curtis, Leigh Goodrich, 1899, C. E., Hamilton.

D

Damron, Carson W., 1897, M. E., Columbus, Jeffrey Mfg. Co.

Davis, Charles William, 1894, E. M., Colorado Springs, Colo., teacher in High School.

Davis, Oscar Allen, 1897, E. E., Sistersville, W. Va., engineer, Carter Oil Co.

Deahl, Walter Smith, 1896, C. E., Pittsburg, Pa.

DeLoffre, Andre, 1896, E. E., Schnectady, N. Y., General Electric Co., engineering department.

Diemer, Hugo, 1896, E E., manager cost dept., Bullock Electric Co., Norwood, Cincinnati.

Donham, Maurice, 1896, M. E., Buffalo, N. Y., Buffalo Forge Co.

Dun, John J., 1883, E. M., Fifteenth avenue. Columbus, consulting engineer.

Dunlap, Thaddeus Cox, 1895, E. E., 8 W. 7th St., Chattanooga, Tenn., consulting engineer.

Dunnick, Edward, 1897, C. E., Columbus, New Columbus Bridge Co.

E

Erskine, John H., 1886, E. M., Lowellsville, fire brick manufacturer.

Estep, Frank Leslie, 1898, E. E., Alliance, O., draftsman, Morgan Engineering Co.

Evans, Peter Platter, 1892, C. E., Boston, Mass., with King Bridge Company.

Eysenbach, Ernest, 1896, E. M., Columbus, superintendent Columbus Gas Co.

F

Feicht, Russell Stimson, 1890, E. E., Pittsburg, Pa., engineering dept., Westinghouse Electric and Mnfg Co.

Fergus, Guy Carlton, 1898, E. E., Zanesville, O., Zanesville Electrical Company.

Fish, Fred Alan, 1898, E. E., Columbus, O., assistant in Electrical Engineering, State University.

Floto, Julius, 1889, E. M., Chicago, Ill.

Flynn, Benjamin Harrison, 1898, C. E., Columbus, with State Board of Health.

Flynn, Harry Franklin, 1892, C. E., Washintgon, D. C., computer, U. S. Geodetic and Coast Survey.

Foster, Frank McMillan, 1894, E. E., Cincinnati, O., with John N. Poage, manufacturing water columns and valves.

Fowler, Harry R., 1894, E. E., Toledo, O., electrical contractor.

Fox, John Herbert, 1897, M. E., Cleveland, Brown Hoisting Machine Company.

Frankenburg, John Theodore, 1899, E. E., Columbus.

Fravel, George, B., 1888, M. E., Indianapolis, Ind., assistant master mechanic, Pan Handle shops.

Frayer, Lee Ambrose, 1896, M. E., Columbus, Columbus Machine Co.

Freeman, Stanton Sholes, 1898, E. M., Columbus.

French, Thomas Ewing, 1895, M. E., Columbus, assistant professor in Drawing, State University.

G

Gallen, William Francis, 1897, M. E., Columbus, Columbus Machine Company.

Gamper, Herman, 1899, M. E., Columbus.

Garber, John Murray, 1897, C. E., Columbus, New Columbus Bridge Company.

Gee, Eugene C, 1897, E. E., Wheeling, W. Va., with Telephone Co.

Gehrkens, Edward Frederick, 1894, E. E., Schnectady, N. Y., with General Electric Co.

Given, James Byron, 1896, E. E., 224 22nd St., Chicago, Ill., president Given Supply Co.

Goddard, Loring Hapgood, 1892, C. E., Sullivan, Indiana, farmer.

Goodell, Ralph Spencer, 1892, C. E., Youngstown, Youngstown Bridge Company.

Graham, Emery Eugene, 1898, E. E., Alliance, O., Morgan Engineering Company.

Grate, Charles Artemus, 1898, M. E., Akron, Adamson Machine Co.

Green, Jerome Joseph, 1893, E. E., Notre Dame, Ind., Notre Dame University, professor of Physics and Electrical Engineering.

Green, Joseph Farist, 1899, E. E., Dayton.

Gregory, Hiram D, 1880, E. M., attorney-at-law, Grayson, Ky.

Griffin Mark H., 1897, E. E., Xenia, electrical engineer Soldiers' and Sailors' Orphans Home.

Groves, John Wesley, 1898, C. E., Batavia.

H

Haas, Frank, 1895, C. E., 1896, E. M., Dayton, O., C., C., C. & St. L. R'y.

Hale, Frederick James, 1898, M. E., Columbus, laboratory assistant in Mechanical Engineering, State University.

Hall, Harry R., 1889, E. M., Dunbar, Pa., assistant general manager Dunbar Furnace Co.

Harrison, William Henry, 1885, C. E., Anaconda, Montana.

Hartwell, Arthur, 1888, M. E., Chicago, Ill., manager Chicago office of the Westinghouse Electrical and Mnfg Co.

Hartwick, Louis M., 1897, M. E., Johnstown, Pa., draftsman in steel works.

Hassler, Robert Hanich, 1892, E. E., Indianapolis, Ind., electrical engineer for Indiana Bicycle Co.

Hayward, George E., 1893, C. E., New Philadelphia, engineer, C. L & W. Ry.

Hazlett, Robert, Jr., 1887, C. E., Wheeling, W. Va., consulting engineer.

Hebble, Charles Roy, 1896, E. E., Cincinnati, electrical engineer.

Heller, Albert Henry, 1890, C. E., Youngstown, Youngstown Bridge Company.

Henderson, Adelbert Andrew, 1898, C. E., Columbus, city engineer corps.

Henretta, Charles Michael, 1896, E. M., Buffalo, Guernsey county, O., engineer, James W. Ellsworth & Co.

Hertner, John Henry, 1899, E. E., Dayton.

Hewitt, Strafford Reeves, 1898, E. E., Columbus, Columbus Belting and Packing Co.

Hine, Lucius A., 1888, E. M., Chicago, Ills., manufacturer light castings.

Hipple, John Merton, 1898, E. E., Turtle Creek, Pa., inspector, Westinghouse Electric and Mfg. Co.

Hirsch, Gustav, 1897, E. E., Washington, D. C., 2d Lieut. U. S. N. Signal Corps.

Homan, Frank, 1895, C. E., New Straitsville, chief engineer, C. & H. C. & I. Co.

Howells, E. S., 1884, E. M., Massillon, O.

Howells, Thomas J., 1897, E. M., Martins Ferry.

Hunt, William Franklin, 1887, M. E., attorney-at-law, New York Life Building, St. Paul, Minn.

Huntington, Arthur, 1899, M. E., Columbus.

Hyle, Charles A., 1896, E. E., San Francisco Weather Bureau.

I

Ireland, Guy Llewellyn, 1895, M. E., Cincinnati.

Irvin, Chadwick H., 1897, M. E., Lima.

J

Jenkins, William B., 1893, C. E., Wilmington, Columbus & Athens Ry.

Jenkins, Willis H., 1894, C. E., New York City, engineer, Street Cleaning Department.

Jennings, Levi E., 1897, E. E., Eaton.

Johnson, Charles W., 1896, E. E., Norwood, Cincinnati, chief draftsman, Bullock Electric Mfg. Co.

Johnson, George Edward, 1892, C. E., Kenova, W. Va., N. & W. Ry.

Johnson, Herbert Lincoln R., E. E., Cincinnati, General Electric Co.

Jones, Arthur James, 1898, E. E., Homestead, Pa., clerk in Carnegie Steel Co.

Jones, Alexander Houston, 1895, E. E., St. Louis, Mo., with B. J. Percival, engineer.

Jones, Pearl N., 1892, M. E., Pittsburg, Pa., engineer and salesman, Westinghouse Electrical and Manufacturing Co.

Jones, Smiley, 1894, E. M., Downieville, Cal., electrician Gold Bluff mine.

Judd, Horace, 1897, M. E., 1899, M. Sc., Columbus.

K

Keffer, Frederick, 1892, E. M., Anaconda, British Columbia, superintendent, Boundary Creek Mining Co.

Kemmler, Edward A., 1888, C. E., 895 S. High street, Columbus, assistant city engineer.

Kerr, Samuel Thompson, 1894, E. E., Martin's Ferry, superintendent, Municipal Electric Light plant.

Kester, Fred. Edward, 1895, E. E., Columbus, assistant in Physics, State University.

Kiesewetter, Frank Louis, 1891, C. E., Columbus, Ohio State Savings Bank.

Kline, Charles, H., 1897, E. E., Dayton.

Knecht, Arthur Edward, 1898, M. E., Cincinnati.

Krumm, Louis Ralph, 1898, E. E., Chicago, Ills., Engineering Dept. Central Union Telephone Co.

Kuhn, Vallie Howard, 1896, E. E., Etna.

L

Lamme, Benjamin G., 1888, M. E., Pittsburg, Pa., engineer, Westinghouse Electrical and Manufacturing Co.

Lamme, Bertha A., 1893, M. E., Pittsburg, Pa., Westinghouse Electrical and Manufacturing Co.

Large, Joseph H., 1890, C. E., Pittsburg, Pa., assistant inspector of bridges, Pennsylvania Southwest System.

Lee, Robert M., 1897, M. E., Pittsburg, Pa., Westinghouse Machine Company.

Levering, Orpheus D., 1893, M. E., Winchester, Mass., The McKay Metallic Fastening Association.

Lincoln, Paul Martyn, M. E., Niagara, N. Y., assistant superintendent, Niagara Falls Power Co.

Lindo, William C., 1896, C. E., Cleveland, O., engineer, "Nickle Plate" Lines.

Linebaugh, Jesse Joseph, 1899, E. E., Pleasant Corners.

Logan, Lavallette Lasea, 1896, E. M., Scranton, Pa., professor National Correspondence School.

Lott, Charles Milford, 1895, E. E., Paulding, O., superintendent, Electric Light and Power Co.

Lovejoy, Ellis, 1885, E. M., Union Furnace, chemist and superintendent, Columbus Brick and Terra Cotta Co.

M

Mackey, Ure LaVerne, 1893, E. E. (B. A., Wooster University).

Manley, Rush Emmett, 1894, E. E., Mt. Vernon, O., manager, Central Union Telephone Co.

Martin, George, 1897, E. E., Massillon, Central Union Telephone Co.

Martin, Percy, 1892, E. E., 4 Frederick Wilhelm Strasse, Berlin, Germany, electric engineer, The Union Electric Co.

Marvin, Charles Frederick, 1883, M. E., Washington, D. C., U. S. Weather Bureau.

Masters, George Albert, 1886, C. E., Toledo.

Matson, William Edgar, 1896, E. E., Lynn, Mass., with General Electric Co.

McAllen, William Johnson, 1894, C. E., Mt. Vernon, O.

McCarter, Robert Dale, Jr., 1895, E. E., Berlin, Germany, with General Electric Co.

McCormick, J. H., 1880, M. E., Dayton, O., with National Cash Register Co.

McCormick, William Francis, 1896, M. E., Columbus.

McGrew, John Alexander, 1895, C. E., engineer, with Pennsylvania Railroad Co.

McGuffey, Francis Hoyt, 1894, E. E., McGuffey, O., wholesale produce Dealer.

McIntire, Alfred Heber, 1898, E. E., Columbus, laboratory assistant in Industrial Arts, State University.

McNary, George Bull, Jr., 1896, E. E., Toledo, O., with Bissell & Co.

Menough, Arthur George, 1894, E. M., Wellsville.

Mercer, Frank Emmet, 1896, E. E., Wauseon.

Mershon, Ralph D., 1890, E. E., New York, N. Y., New York office of Westinghouse Electrical and Manufacturing Co.

Miller, Frank Case, 1893, C. E., Columbus, assistant engineer, C., S. & H., Short Line Division.

Miller, Harry Franklin, 1889, M. E., McKeesport, constructing engineer, National Tube Works.

Morris, Clyde Tucker, 1898, C. E., Columbus, New Columbus Bridge Company.

Morrison, Robert O., 1893, C. E., Cincinnati, engineer on P., C., C. & St. L., R. R.

Morton, George L., 1884, M. E. (LL. B., National Law School), Patent Office, Washington, D. C., chief examiner, Department Electricity.

Munn, Mortimer Adam, 1894, C. E., Springfield, engineer.

Myers, Ord, 1895, E. E., New York, N. Y., inspector, Metropolitan St. Ry. Co.

Myers, Roy V., 1893, C. E., Dayton, Tenn., mining engineer.

Myers, Uriah H., 1887, E. M., Allegheny, Pa., chemist, Marshall Kennedy Milling Co.

N

Nagel, William G., 1895, E. E., Toledo, O., W. G. Nagle & Co., Electric supplies.

Newton, Samuel Donald, 1895, C. E., engineer on Southern R. R.

Nurian, Kerson, 1899, M. E., Schenectady, N. Y., Schenectady Locomotive Works.

O

O'Brine, David, 1881, B. Sc., M. Sc., E. M., D. Sc., M. D., Urbana, physician.

Orton, Edward, Jr., 1884, E. M., Columbus, director of the Department of Clay-working and Ceramics, State University.

P

Pabodie, Robert Jewett, 1899, M. E., Wyoming.

Palmer, Walter K., 1893, M. E., State University, Lawrence Kansas, professor of Mechanical Engineering.

Patch, Homer Austin, 1896, C. E., Youngstown, Youngstown Bridge Company.

Payne, Halbert Edwin, 1887, M. E., New York City, American Typewriter Company.

Pearl, Allen Sexton, 1894, M. E., Chicago., Ill., salesman, Central Electric Company.

Pedlow, Edward Benjamin, 1893, C. E., New Straitsville, superintendent, Columbus and Hocking Coal and Iron Co.

Pence, David Arrel, 1894, M. E., Lowellville.

Peppel, Samuel Vernon, 1899, B. Sc. (Chemistry), Leetonia.

Peters, William Lincoln, 1885, M. E., Riverside, Cal., manufacturer.

Peirce, John Mattison, 1895, E. E., South Charleston, O.

Pilcher, Hastings Moore, 1895, E. E.

Pleukharp, Charles V., 1885, M. E., Columbus, pastor South High Street M. E. Church.

Polk, Walter C., 1895, C. E., Indianapolis, Ind., assistant general foreman, Central Union Telephone Co.

Postle, Herman R., 1894, C. E., Columbus, teacher.

Powell, Charles S., 1893, E. E., Cleveland, O., representing Westinghouse Electrical Manufacturing Co.

R

Rawson, Levi, 1899, C. E., Lisbon.

Ray, Frank A., 1887, E. M., 137 King ave., Columbus, associate professor of Mine Engineering, State University.

Ray, William M., 1893, C. E., Room 825, Hickox Bld., Cleveland, C., L. & W. R. R.

Raymond, Coles Abel, 1894, C. E., Youngstown, Youngstown Bridge Company.

Reed, Robert Browning, 1896, E. E., Zanesville, electrical contractor.

Reed, William Allen, 1897, E. M., Central City, Colo., assaying offices Alsdorf & Paul.

Reeves, Archibald C., 1887, C. E., 153 Superior avenue, Dayton.

Rice, Herbert A., 1897, C. E., Columbus, with Yost & Packard, architects.

Riddle, Howard Sterling, 1897, E. E., Columbus, O., with Jeffrey Mfg. Co.

Roberts, Cyrus Swan, 1898, E. M., San Luis Potosi, with the Cia Metaturica Mexicana.

Robinson, Erdis Geroska, 1893, C. E., Mexico, Engineering Department Mexican Central R. R.

Rogers, James Bertrand, 1896, E. M., Steubenville, National Steel Co., Mingo Junction.

Root, Willis J., 1885, E. M., Columbus, chemist, King Gilbert & Warner Steel Co.

Rowlee, Henry A., 1897, M. E., Columbus, inspector ordnance, U. S. A.

Ruhlen, Carl Marble, 1898, M. E., Honolulu, S. I., Quartermaster's Department, U. S. A.

S

Schaub, Edward Louis Tascher, 1885, M. E., Dennison, with P., C., C. & St. L. R. R.

Schaup, Charles E., 1897, E. M., Syracuse, N. Y., assistant engineer, West Short R. R.

Scheibell, William O., 1888, E. M., Upper Sandusky, O., manufacturer artificial stone.

Schreiber, John Martin, 1899, E. E., Ironton.

Schroll, Otto, 1886, C. E., Wheeling, W. Va., civil engineer.

Sedgwick, Edward Crayton, 1895, E. E., Zanesville, O.

Serva, Adam A., 1893, E. E., New York, N. Y., with General Electric Company.

Sharp, Charles C., 1888, C. E., Corning, superintendent Mining Department, Sunday Creek Coal Co.

Sherman, Christopher Elias, 1894, C. E., Columbus, assistant professor in Civil Engineering, State University.

Simonton, Mark, 1895, E. E., Columbus, O.

Skinner, Charles E., 1890, M. E., box 435, Wilkinsburg, Pa., Westinghouse Electrical and Manufacturing Co.

Smith, David William, 1899, C. E., Ashland.

Sperr, Frederick, W., 1883, E. M., Houghton, Mich, professor of Civil and Mining Engineering, Michigan School of Mines.

Sprague, Clarence Milton, 1899, C. E., Summerford.

Spurrier, John Randolph, 1896, E. E., Pittsburg, Pa., Westinghouse Electric and Manufacturing Co.

Staley, Marcellus, 1899, E. E., Dayton.

Starbuck, Daniel Karl, 1899, E. E., Barnesville.

Stewart, Lee Raymond, 1896, C. E., Youngstown Bridge Works.

Stewart, Harford Toland, 1896, E. E., Schenectady, N. Y., with General Electric Co.

Stinebaugh, Isaac Long, 1892, C. E., teacher.

Stone, Carleton Elijah, 1899, C. E., Gallipolis.

Storer Norman Wilson, 1891, E. E., Pittsburgh, Pa., Westinghouse Electrical and Manufacturing Co.

Storer, Simon B., 1893, E. E., Syracuse, N. Y., engineer and salesman, Westinghouse Electric and Mfg. Co.

Stull, Emmett Willett, 1894, E. E., Johnstown, Pa., draftsman, motor department, The Lorain Steel Co.

Stump, John William, 1895, C. E., county engineer, Fairfield Co., O.

T

Taylor, Arthur W, 1894, E. M., Cleveland, chemist for Cleveland Furnace Co.

Thomas, James O, 1897, C. E., Columbus.

Tomlinson, James Rowe, 1892, C. E., Youngstown, Youngstown Bridge Co.

Towne, Robert S., 1879, B. Sc., E. M., 20 Nassau street, New York, N. Y., president Mexican Northern Railway.

Tufts, Charles Hill, 1899, E. M., Maineville.

Turner, Arthur M., 1893, E. E.

U

Urban, Harry Marshall, 1898, C. E., Pittsburg, Pa., engineer, P., C., C. & St. L. R'y.

V

Vandervoort, William P., 1886, E. M., Morrow, superintendent of schools.

Viets, Willis B., 1886, E. M., Parryville, Pa., chemist Carbon Coal and Iron Co.

W

Wadsworth, F. L., Olcutt, 1888, B. Sc., E. M., M. E., Williams Bay, Wisconsin, assistant professor of Astro-Phyics, University of Chicago, Yerkes Observatory.

Walker, James Madison, 1896, C. E., Zanesville, B. & O. R. R.

Watt, Stern P., 1886, M. E., Columbus.

Weick, Charles William, 1898, B. Sc. (Ind. Arts), professor Manual Training, Teachers' College, Columbia University, New York.

Welch, Clark J., 1888, C. E., Youngstown, bridge engineer.

Welch, Oliver Bartlett, 1895, E. E., Dennison, electrician, United Electric Co.

Wilcox, Alvah Newton, 1895, E. E., Dayton.

Wirthwein, Louis Philip, 1899, C. E., Columbus.

Wise, Albert Joseph, 1898, C. E., Cleveland, C., C., C. & St. L. R. R.

Wolf, Herman Howard, 1895, C. E., Lieut. U. S. Navy.

Z

Zaumseil, Oscar C., 1887, C. E., 126 Seeley avenue, Chicago, Ill., architect.

Zurfluh, William Nicholas, 1894, E. E., Toledo, with F. Bissell & Co.

List of Graduates from other Colleges of the Ohio State University who are now doing Engineering Work

---

Converse, Howard Pendleton, 1887, B. Sc., 166 Devonshire street, Boston, Mass., manager Boston office Cooper, Hewitt & Co., steel and iron manufacturers.

Evans, Ernest, 1892, B. Sc., Mingo Junction, Ohio, chemist Laughlin Junction Steel Co.

Howald, Ferdinand, 1878, B. Sc., Rush Run, W. Va., manager coal mines.

Humphrey, J. Scott, 1879, B. Sc., Findlay, Ohio, civil engineer.

Jones, Jesse Lee, 1890, B. A., Philadelphia, Pa., chemist William Cramp & Sons, ship builders.

Kirker, Harry L., 1889, B. Sc., Centreville, Idaho, electrical engineer for Basic Co.

Knopf, George W., 1883, B. Sc., Pittsburg, Pa., bridge builder.

Lovejoy, Jesse R., 1884, B. Sc., Schnectady, N. Y., with General Electric Co.

McDowell, John Andrew, 1882, B. Sc., Columbus, O., chemist and superintendent Portland Cement Co.

Mix, Edgar W., B. Sc., 12 Boulevard des Invalides, Paris, France, superintendent, Le Society des Establissements.

Moyer, Henry E, 1893, B. Sc., Youngstown, chemist Youngstown Steel Co.

Newton, Henry S., 1889, B. Sc., Syracuse, N. Y., general manager, Syracuse, Lakeside & Baldwinsville R'y.

Phelps, Cyrus Alba, 1892, B. Sc., Sombereto, Jacataccas, Mexico, with Sombereto Mining and Milling Co.

Ritchey, Joseph C, 1890, B. Sc., Mingo Junction, with Junction Iron and Steel Co.

Scott, Charles Felton, 1885, B. A., Pittsburg, Pa., chief electrician Westinghouse Electric and Manufacturing Co.

Short, Sidney H., B. Sc., Cleveland, O., electrical engineer and vice president of Walker Manufacturing Co.

Smith, Burton Griffin, 1895, G. Ph., Detroit, Mich., chemist for the Ray Chemical Co.

Somermier, Edward Everett, 1898, G. Ph., assistant in Metallurgy, State University.

Ward, John C., 1880, B. A., Painesville, O., engineer and surveyor.

Wikoff, John Burkett, 1884, B. Ph., Cambridge, assistant to general manager Cleveland & Marietta Railway Co.

DIRECTORY OF THOSE WHO HAVE COMPLETED SHORT COURSES

CERAMICS.

Adams, John Carroll, 1897, Lynchburg, Va., with I. H. Adams, brick manufacturer.

Berkey, Leslie Reese, 1899, Bolivar, Pa., with Reese, Hammond & Co., fire brick makers.

Bleininger, Albert Victor, 1897, Columbus, O., laboratory assistant, Department Ceramics, O. S. U.

Braddock, Everett F., 1896, Richfield, O.

Campbell, Augustine Ray, 1898, Tottenville, Staten Island, N. Y., chemist, Atlantic Terra Cotta Co.

Giessen, Carl, 1896, Mount Savage, Md., chemist, Mt. Savage Enameled Brick Co.

Gorton, Elmer Ellsworth, 1896, Terra Cotta, Ills., chemist, American Terra Cotta and Ceramic Co.

Hensel, Otto, 1897, Chicago Heights, Ills., chemist, Ludowici Roofing Tile Co.

Ittner, Warren Wayne, 1899, St. Louis, Mo., with Anthony Ittner, brick manufacturer.

Jones, Edward F., 1896, Atlanta, Ga., with Atlanta Terra Cotta Co.

Post, Malcolm Phelps, 1899, St. Louis, Mo., student in Four-year Course in Ceramics, O. S. U.

Purdy, Ross C., 1898, Zanesville, O., with Mosaic Tile Co.

Thomas, David C., 1896, Toronto, O., with Toronto Pottery Co.

Wolfley, John W, 1896, Delaware, O.

Worcester, Wolsey G., 1899, Columbus, Ohio.

MINING

Anderson, Arthur, 1888, Shawnee, O.

Blower, J. W., 1892, Bunola, Pa.

Bohm, Oscar Herman, 1899, Cleveland, O.

Boyd, Arthur, 1893, Thurman, W. Va., superintendent Thurman Coal Company.

Brophy John S., 1896, Frostburgh, Md., superintendent mines.

Carroll, Patrick, 1891, Houtzdale, Pa.

Dixon, C. F., 1890, Phillipsburg, Pa.

Evans, John M., 1895, Shawnee, O.

Fyfe, John, 1891, Houtzdale, Pa.
Gildroy, R. E., 1891, Whatcheer, Ia.
Harrigan, Archer, 1899, Newcastle, Pa.
Harrigan, Patrick, 1898, Jackson, O., Fluhart Coal and Mining Co.
Herron, J. S., 1893, Walkersville, Pa.
Jenkins, Jonathan, 1891, Frostburgh, Md.
Laviers, Henry, 1893, Jackson, O., engineer Superior Coal Co.
Lochrie, John, 1890, Houtzdale, Pa.
McKey, R. F., 1894, Coal Glenn, Pa.
Moss, James, 1891, Byersville, O.
Newton, E. A., 1893, Jeffries, Pa.
Nichols, J. L. D., 1895.
Oakes, C. H., Jr., 1892, Jackson Center, Pa.
Phillips, F. R., 1893, Laonoconing, Md.
Quigley, John, 1893, Westville, Pa.
Quigley, Robert, 1894, Westville, Pa.
Quinn, John, 1891, Houtzdale, Pa.
Ralston, William, 1896, Newman, O.
Rees, David, 1891, Cleveland, O.
Rees, Evan, 1895, Jacksonville, O., mine surveyor.
Snedden, James, 1892, Antrim, Pa.
Tetlow, W. A., 1892, Washingtonville, O.
Wright, John, 1892, Antrim, Pa.

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UNIVERSITY BULLETIN SERIES 4—NO. 24

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

OHIO STATE UNIVERSITY

1900-1901

Entered at the Postoffice at Columbus, Ohio, as second-class matter

OHIO STATE UNIVERSITY

CATALOGUE

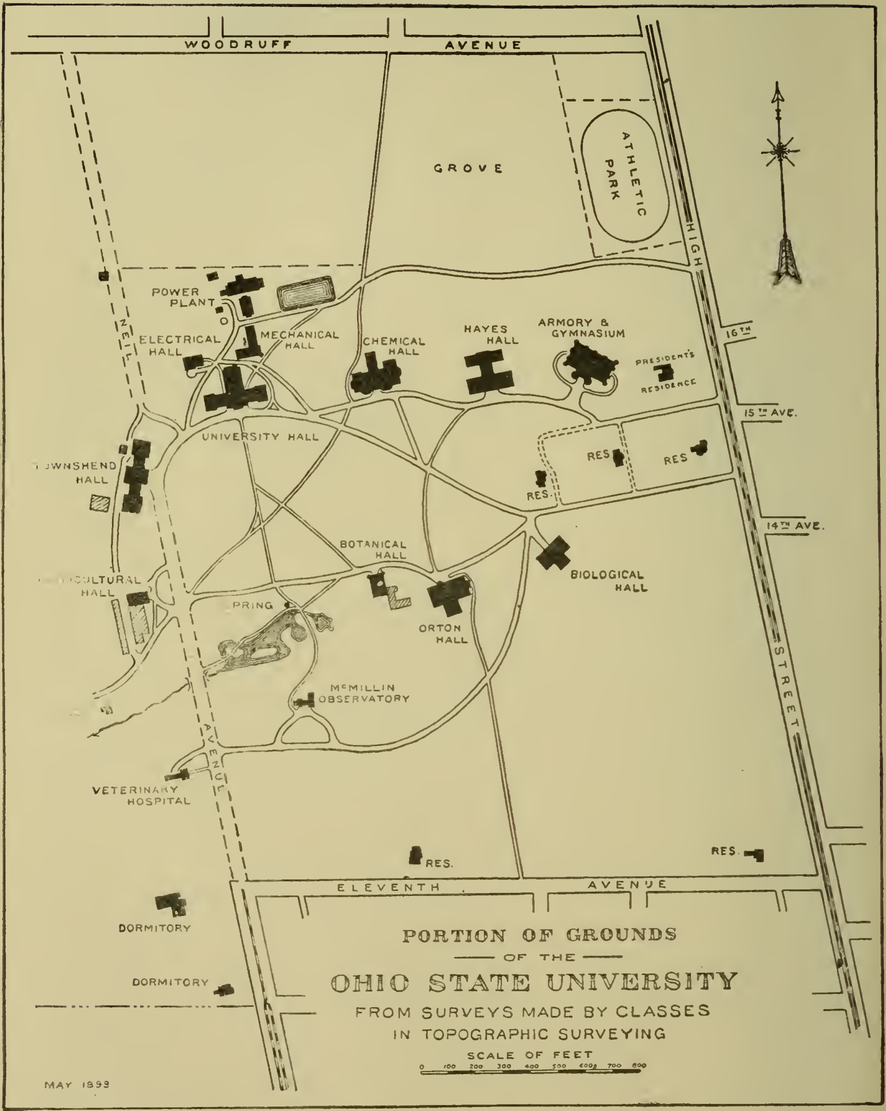
OF THE

COLLEGE OF ENGINEERING

COURSES OF INSTRUCTION
BUILDINGS
EQUIPMENT
FACULTY
ALUMNI
STUDENTS

1900-1901

COLUMBUS
Published by the University
April, 1900



PORTION OF GROUNDS
OF THE
OHIO STATE UNIVERSITY
FROM SURVEYS MADE BY CLASSES
IN TOPOGRAPHIC SURVEYING

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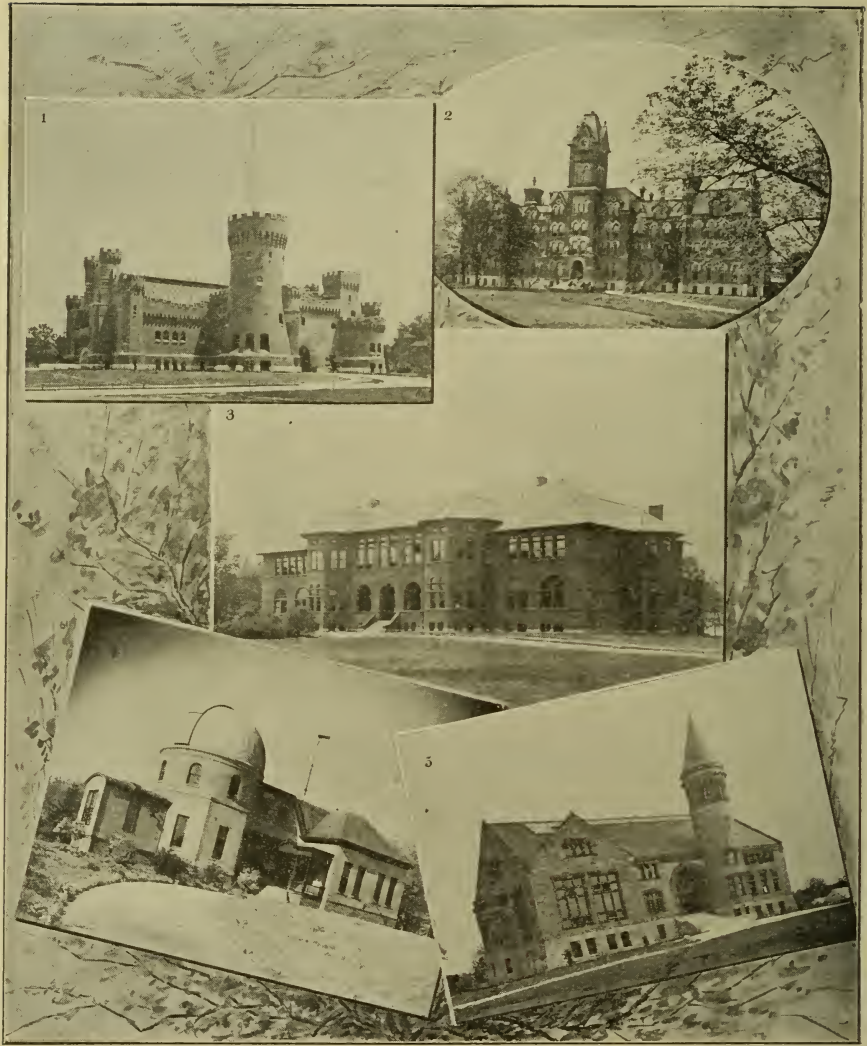


1—ARMORY AND GYMNASIUM 2—UNIVERSITY HALL
3—CHEMICAL HALL
4—EMERSON McMILLIN OBSERVATORY 5—ORTON HALL

The Ohio State University

Under an act of Congress passed July 2, 1862, the State of Ohio received from the United States a large grant of the public lands for the purpose of establishing a "college where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such a manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In accordance with this act, the Ohio State University was founded by the State as a public institution of learning. The governing body of the institution is a Board of Trustees, appointed by the Governor of the State for terms of seven years, as provided in the law organizing the University. The original endowment has been supplemented, and the objects of the University promoted, by a permanent annual grant from the United States, under an act of 1890, by special appropriations of the General Assembly; and in 1891, by a permanent annual grant from the State, which grant was doubled by the Legislature of 1896. Through the aid which has been received from the United States and from the State it is enabled to offer its privileges, with a slight charge for incidental expenses, to all persons of either sex who are qualified for admission.

The University is divided into six colleges as follows:

The College of Agriculture and Domestic Science.
The College of Arts Philosophy and Science.
The College of Engineering.
The College of Law.
The College of Pharmacy.
The College of Veterinary Medicine.

Each of the above named colleges is under the direction of its own Faculty, which has power to act in all matters pertaining to the work of the students of that particular college. The aim of the University is to give to the young men and women of Ohio the largest possible opportunity for both general and special training, in order to prepare them for the various duties of life.

The University is situated within the corporate limits of the city of Columbus, two miles north of the Union Depot and about

three miles from the State Capitol. The University grounds consist of three hundred and thirty acres. The western portion, about two hundred acres, is devoted to agriculture and horticultural purposes, and is under the management of the College of Agriculture and Domestic Science. The eastern portion is occupied by the principal University buildings, eleven in number, the campus, athletic and drill grounds, a park-like meadow, and a few acres of primitive forest.

The College of Engineering

Since the inception of the University, the College of Engineering has manifested a vigorous and steady growth. To a large extent this growth represents the demand of the people from whom the University derives its support, for it has been the constant policy of the University to enlarge and foster each branch of educational work in response to every intelligent demand.

Yet it is true that the State has advanced and shaped public opinion by providing educational facilities somewhat in advance of public demand. Through its University it has established and built up a system of technical education which is more important than any other single agency in the development of the commercial and industrial interests of Ohio. The marvelous industrial progress made in this State and country in recent years is the best indication of the benefits which have already begun to accrue from the enlargement of technical training, and from its constant subdivision and expansion.

At present the College offers instruction in nine important fields of Engineering work. Covering these, the following four year courses of study are given:

1. *Architecture,* leading to the degree of Civil Engineer in Architecture (C. E. in Arch.). Established in 1900.
2. *Ceramics,* leading to the degree of Engineer of Mines in Ceramics (E. M. in Cer.). Established in 1896.
3. *Chemistry,* leading to the degree of Bachelor of Science in Chemistry (B. Sc.). Established in 1897.
4. *Civil Engineering,* leading to the degree of Civil Engineer (C. E.). Established in 1873.

5. *Electrical Engineering,* leading to the degree of Mechanical Engineer in Electrical Engineering (M. E. in E. E.), Established in 1889.

6. *Industrial Arts,* leading to the degree of Bachelor of Science in Industrial Arts (B. Sc.). Established in 1893.

7. *Manual Training,* leading to the degree of Bachelor of Science in Industrial Arts (B. Sc.). Established in 1893.

8. *Mechanical Engineering,* leading to the degree of Mechanical Engineer (M. E.). Established in 1879.

9. *Mining Engineering,* leading to the degree of Engineer of Mines (E. M.). Established in 1878.

The following short courses do not lead to degrees, but students completing them are furnished with formal certificates setting forth the work they have accomplished:

10. *Clay-working,* two years. Established in 1894.

11. *Industrial Arts and Shopwork,* two years. Established in 1896.

12. *Mining,* two years. Established in 1887.

The instruction necessary to the completion of these various courses of study is given in twenty-three different departments, under sixty-three professors and assistants. In addition, in some of the courses in this College elective work is offered, which may be taken from any of the thirty-five departments of the University.

The various departments of the College of Engineering, or shared by this College, occupy about two-thirds of Chemical Hall, nearly the whole of Hayes Hall, the whole of the Mechanical and Electrical buildings, portions of Orton Hall and of the main University building. The equipment for teaching technical and scientific subjects is, in the main, excellent, and in some departments is exceptional. In all departments the annual increase in apparatus and facilities is rapidly making the equipment more perfect and complete.

The Library of the University, consisting of about 32,000 volumes and 9,000 unbound publications, is able to fill the demands of the Engineering students for the most important treatises in their respective fields of science.

DAYS AND DATES

1900

Entrance Examination (8 A. M.)	Monday,	September 17.
Registration.	Tuesday,	September 18.
Lectures and Class-work begin	Wednesday,	September 19.
Meeting of Trustees	Wednesday,	September 26.
Thanksgiving Recess	Thursday, Friday,	November 29. November 30.
First Term ends	Wednesday,	December 19.

Christmas Vacation.

1901

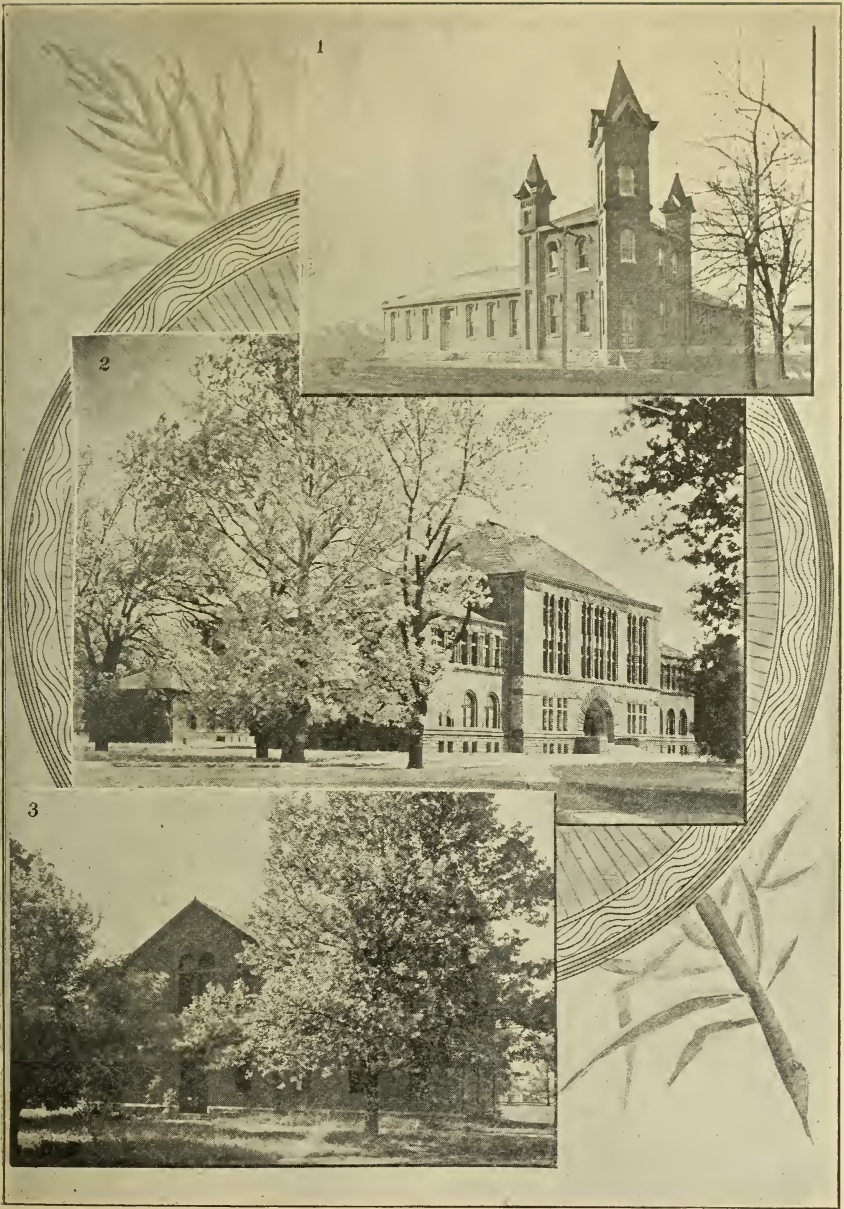
Second Term begins — Registration Day	Wednesday,	January 2.
University Day	Friday,	February 22.
Second Term ends	Friday,	March 29.

Spring Recess.

Third Term begins — Registration Day	Wednesday,	April 3.
Meeting of Trustees	Wednesday,	April 3.
High School Day	Friday,	May 17.
Field Day — Athletic Association	Saturday,	May 18.
Senior Vacation begins.	Saturday,	May 25.
Competitive Drill, Cadet Battalion	Saturday,	May 25.
Memorial Day	Thursday,	May 30.
Final Examinations (all Colleges)	Monday to Friday,	June 10. June 14.
Baccalaureate Sermon	Sunday,	June 16.
Entrance Examinations (8 A. M.)	Monday, Tuesday,	June 17. June 18.
Class Day.	Monday,	June 17.
Meeting of Trustees	Tuesday,	June 18.
Alumni Day	Tuesday,	June 18.
COMMENCEMENT	Wednesday,	June 19.

Summer Vacation.

Entrance Examination (8 A. M.)	Monday,	September 16.
Registration.	Tuesday,	September 17.
Lectures and Class-work begin	Wednesday,	September 18.
Annual Address by the President (11 A. M.)	Friday,	September 20.
Meeting of Trustees	Wednesday,	September 25.



1—MECHANICAL HALL
2—HAYES HALL
3—ELECTRICAL BUILDING

CORPS OF INSTRUCTION

REV. WILLIAM OXLEY THOMPSON, D. D..................University Grounds
President of the University.

NATHANIEL WRIGHT LORD, E. M., Dean..........338 West Eighth Avenue
Professor of Metallurgy and Mineralogy and Director of the School of Mines.

*EDWARD ORTON, Ph. D., LL. D..............................100 Twentieth Street
Professor of Geology.

SIDNEY AUGUSTUS NORTON, Ph. D., LL. D.............363 East Town Street
Emeritus Professor of Chemistry.

STILLMAN W. ROBINSON, D. Sc..........................1353 Highland Street
Emeritus Professor of Mechanical Engineering.

BENJAMIN FRANKLIN THOMAS, Ph. D...................University Grounds
Professor of Physics.

GEORGE WELLS KNIGHT, Ph. D...............................University Grounds
Professor of American History and Political Science.

ROSSER DANIEL BOHANNAN, B. Sc., C. E., E. M...16th and Indianola Aves.
Professor of Mathematics.

C. NEWTON BROWN, C. E..................................1343 Forsythe Avenue
Professor of Civil Engineering.

ERNST AUGUST EGGERS.......................................University Grounds
Professor of the Germanic Languages and Literatures.

ALBERT MARTIN BLEILE, M. D.....................................218 King Avenue
Professor of Anatomy and Physiology.

WILLIAM ASHBROOK KELLERMAN, Ph. D.................175 Eleventh Avenue
Professor of Botany.

BENJAMIN LESTER BOWEN, Ph. D........................46 Jefferson Avenue
Professor of the Romance Languages and Literatures.

JOSEPH VILLIERS DENNEY, B. A.......................230 West Tenth Avenue
Professor of Rhetoric and the English Language.

EDWARD ORTON, Jr., E. M., Secretary.....................The Normandie
Director of the Department of Clay-Working and Ceramics.

WILLIAM T. MAGRUDER, M. E.......................................191 King Avenue
Professor of Mechanical Engineering.

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* Died October 16, 1899.

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Professor of Education.

WILLIAM McPHERSON, D. Sc., Ph. D........................97 Hamilton Avenue
Professor of Chemistry.

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Professor of Drawing.

FRANK EDWIN SANBORN, Sc. B......................380 West Eighth Avenue
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HENRY CURWEN LORD, B. Sc..........................401 West Sixth Avenue
Director of the Emerson McMillin Observatory and Associate Professor of Astronomy.

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FREDERICK, CONVERSE CLARK, PH. D.........................1634 Neil Avenue
Associate Professor of Economics and Sociology.

EMBURY ASBURY HITCHCOCK, M. E...............380 West Eighth Avenue
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CHARLES WALTER MESLOH, M. A..Corner High Street and Eleventh Avenue
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Assistant in Drawing.

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† Resigned in January, 1900.

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COURSES OF STUDY

In the following pages is given a statement of the general nature and scope of the various courses of instruction, and the fields of usefulness for which they are believed to constitute an efficient preparation. The courses themselves are given in schedule form, and with reference numbers, by which the exact nature of each subject and something of its method of presentation can be found on consulting the lists of studies given under each Department.

Courses Leading to a Degree

The first year of each of the four year courses leading to a degree is very similar. There are two reasons for this:

First. All engineering education is based on the constant use of the fundamental sciences, Mathematics, Physics, Chemistry and Drawing. Consequently, it naturally happens that the various courses start from a common point, proceed side by side for a time, but specialize and subdivide more and more as they progress towards completion.

Second. It is very commonly the case with young men entering college for a technical education, that their natural aptitude for one line of work or another has not been sufficiently developed to enable them to make a wise or final selection of their course in the University.

To obviate the necessity for this selection immediately on entering the University, and to give the incoming students time to learn something of University methods of instruction and of the scope of the various courses, and to enable their instructors to give sound advice to such students as choose to consult with them on this subject, the first year of each of the Engineering Courses leading to a degree has been made as much like the others as is consistent with the purposes of the course.

In all courses, the first two terms of the first year are substantially alike; in the third term, three-fourths of the work still remains identical, while the remaining fourth is varied to meet the diverging requirements of the succeeding year. Thus it is seen that at least two terms may elapse before the student need announce his choice of work, and even at the beginning of the second year, the courses have diverged so little that any good student can reconsider his selection with but little embarrassment or extra work.

The following table shows the requirements for the first year of each of the four year courses:

FIRST YEAR

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST TERM

ALL COURSES.

	Credit hours
Mathematics (14) Plane Trigonometry.	5.
Chemistry (7) Inorganic.	5.
Modern Language * French or German.	4.
Rhetoric (5) Paragraph Writing.	2½.
Drawing (1) Freehand.	2.
†Military Drill	

SECOND TERM

ALL COURSES.

	Credit hours
Mathematics (15) Spherical Trigonometry.	2.
Mathematics (16) College Algebra.	3.
Chemistry (7) Inorganic.	5.
Modern Language * French or German.	4.
Rhetoric (5) Theme Writing.	2½.
Drawing (1) Freehand.	2.
Military Drill	

* The modern language may be French or German except in Ceramics and Chemistry, where German is required.

† Military Drill is required except in cases of physical disability, when prescription work in the Gymnasium, under charge of the Director of Physical Training, is given in lieu of Drill.

THIRD TERM

FOR COURSES IN ARCHITECTURE CIVIL ENGINEERING MINING ENGINEERING	Credit hours	FOR COURSES IN CERAMICS CHEMISTRY INDUSTRIAL ARTS MANUAL TRAINING	Credit hours	FOR COURSES IN ELECTRICAL ENGINEER'G MECHANICAL ENG'ING	Credit hours
Mathematics (17) Plane Analytics.	5.	Mathematics (17) Plane Analytics.	5.	Mathematics (17) Plane Analytics.	5.
Metallurgy (2) Mineralogy.	3.	Chemistry (12) Qualitative Analysis.	5.	Shopwork (7) Carp'y & Pat. Making.	4.
Modern Language French or German.	4.	Modern Language French or German.	4.	Modern Language French or German.	4.
Rhetoric (5) Prose Analysis.	2½.	Rhetoric (5) Prose Analysis.	2½.	Rhetoric (5) Prose Analysis.	2½.
Drawing (2) Lettering.	3.	Drawing (2) Lettering.	3.	Drawing (2) Lettering.	3.
Military Drill		Military Drill		Military Drill	

COURSE IN ARCHITECTURE

This course is designed to produce men who unite a thorough knowledge of those phases of engineering which deal with the materials and methods of architectural construction, and a special training in appropriate and harmonious use of form, color, and decorative design.

Recent years have developed types of buildings without precedent in the history of architecture, in which the amount of unencumbered internal space obtained is as remarkable as the safety, durability, comfort and healthfulness of the buildings themselves. The ends obtained in the modern, tall, steel-skeleton building would have been utterly impossible in the solid masonry structures of the past.

Mathematics, the foundation for the solution of constructive problems, is studied for three years, and in the technical work of the course its use is constant.

Drawing is an important factor in the education of the architect, and includes that of the engineer and of the artist, being controlled partly by considerations of fact and partly by those of appearance. It extends in some form throughout the course, including freehand, mechanical, descriptive geometry, shades and shadows, perspective, pen drawing, brush-drawing in color, clay-modeling; and is applied in the architectural designing.

The engineering technical work includes: strength of materials, testing materials, strains in trusses and framed structures, masonry, mortars, electricity and surveying.

The rapidly increasing application of electricity in modern buildings requires architects and superintendents of buildings to know the fundamentals of electric construction and, at least, the common sources of danger in its use. To meet this need the course in physics is supplemented with two terms of electrical engineering. For similar purposes in the safe installation of water and steam piping, elevators, and power, a laboratory course in experimental mechanical engineering succeeds the regular course in mechanics and strength of materials.

The history of architecture, necessary to broaden the student's architectural knowledge, is given a prominent place, and is freely illustrated by a selected set of lantern slides.

Decoration and ornament comprises a study of the decorative details of the different styles of architecture, both in carved ornament and decorative color.

The technical architecture includes: designing architectural structures complete, specifications, heating, ventilating, plumbing, estimates, fire-proofing, superintendance and contracts.

See also pages 39-40.

COURSE IN ARCHITECTURE

NOTE -- The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	5.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Architecture (9) Hist'y of Architecture.	3.	Architecture (10) Hist'y of Architecture.	3.	Architecture (11) Hist'y of Architecture.	3.
Architecture (12) Detail Drawing.	2.	Architecture (13) Detail Drawing.	2.	Architecture (14) Detail Drawing.	2.
Drawing (14) Pen Drawing.	2.				
Military Drill.		Military Drill.		Military Drill.	

THIRD YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mech. Eng'ring (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Architecture (15) Designing.	4.	Architecture (16) Designing.	2.	Architecture (17) Designing.	4.
Drawing (7) Photography.	2.	Drawing (12) Clay Modeling.	2.	Drawing (12) Clay Modeling.	2.
Elec. Eng'ring (6) Lectures.	2.	Elec. Eng. (6 & 7) Lectures and Lab.	4.		
Architecture (5) Decorations, etc.	3.	Civil Eng. (6) Stereotomy.	4.	Civil Eng. (19) Trusses.	5.
Rhetoric (3)	2.	Rhetoric (3)	2.	Rhetoric (3)	2.

FOURTH YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Architecture (18) Designing.	4.	Architecture (4) Specifications.	2.	Architecture (6) Estimates and Supt.	4.
Civil Eng. (15) Masonry.	5.	Architecture (7) Heating, Vent., etc.	5.	Architecture (19) Designing.	4.
Mech. Eng. (23) Materials of Const.	4.	Architecture (8) Designing.	5.	Architecture (20) Thesis.	5.
Geology (5) General.	5.	Geology (6) Economic.	3.	Civil Eng. (21) Surveying.	3.
		Drawing (18) Color work.	3.	Drawing (19) Color work.	2.

THESIS

COURSE IN CERAMICS

The Ceramic Industries include, according to the classification here adopted, those industries in which the production and utilization of natural and artificial silicates is the end in view, viz., clayware, glass and cement. These three industries constitute a natural division of chemical technology, and though they are intimately connected with the field of the metallurgist on the one hand and with the manufacturing chemist on the other, still they have an individuality which necessitates their study and exploitation as a separate field of industrial science.

The work which the ceramic engineer must be prepared to supervise is broad and varied. In the preparation of any product of uniform physical and chemical qualities from the crude rocks and minerals of the earth's surface, a knowledge of chemistry is the foremost essential, and no one without the training of the chemical laboratory, in which an account must be rendered for everything, can hope to attain the highest mastery in this subject. In this course, therefore, chemistry forms an important part of the training, beginning with the first term and continuing through three years of purely chemical work, followed by a year of practice in the application of chemistry to ceramic operations.

But the ceramic engineer will be subjected to other calls on his resources. He must be able to intelligently search for and locate deposits of the crude mineral supplies which he needs, and having found them, he must be able to win them safely and economically, whether on the surface or under ground in mines. To this end, the student is given training in mineralogy, geology, both historic and economic, metallurgy, so far as it pertains to fuels and iron, and mine engineering.

Also, like the metallurgist, the ceramist deals with reagents and performs chemical reactions on a gigantic scale; and in the winning of the materials, their mechanical preparation, their economic handling and storage, their manufacture into useful forms, and in the construction of buildings, machinery, kilns and furnaces for these purposes, the knowledge and resources of the trained engineer must constantly re-enforce those of the chemist and geologist. Accordingly the course includes a vigorous drill in mathematics, physics, mechanics, strength of materials, drawing, drafting, shopwork and construction. In addition, at least one year of german and two years in the correct use of the english language are required.

See also pages 44-48.

COURSE IN CERAMICS

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Ceramics (1) Laboratory.	5.	Ceramics (2) Laboratory.	5.	Ceramics (3) Laboratory.	5.
Military Drill.		Military Drill.		Military Drill.	

THIRD YEAR

Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Ceramics (4) General Principles.	5.	Ceramics (5) Bricks.	5.	Ceramics (6) Pottery.	5.
Mine Eng. (4) Mine Surveying.	5.	Ceramics (7) Adv. Chem. Lab.	5.	Metallurgy (2) Mineralogy.	3.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
				Shopwork (11) Forging.	3.

FOURTH YEAR

Ceramics (9) Manf. of Bodies.	5.	Ceramics (10) Glasses and Glazes.	5.	Ceramics (11) Enamels, Colors.	5.
Metallurgy (4) Fuels and Iron.	5.	Ceramics (12) Cement.	5.	Ceramics (15) Thesis Work.	5
Shopwork (4) Chipping and Filing.	3.	Ceramics (17) Ceramic Const.	4.	Ceramics (14) Reports.	5.
Geology (5) General.	5.	Geology (6) Economic.	3.	Drawing (7) Photography.	2.

THESIS

COURSE IN CHEMISTRY

This Course has been prepared to meet the growing demand for trained men in the numerous manufacturing industries which are based upon chemical processes or employ them prominently in their work, and which are not included in the fields of metallurgy and ceramics. Among such may be mentioned the manufacture of acids, alkalies, salts, chemical reagents, paints, colors, dyes, bleaching powders, soaps, glue, gelatine, glycerine, tanning compounds, starch, sugar, dextrine and glucose, alcohol, ferments, preservatives, antiseptics, fertilizers, pyrotechnics, matches and many others.

In order to meet the demands of such widely diversified industries, it is necessary that the training offered shall be somewhat elastic and permit the student to specialize somewhat in advance of his graduation.

The work of the course is therefore partly required and partly elective.

The compulsory work is planned to meet two requirements: 1st, a thorough knowledge and grasp of the science of chemistry; and 2d, sufficient general training in engineering to enable the student to plan the execution of chemical work on a large scale, and with the mechanical aids necessary to commercial success.

The student begins his chemical work in the first year with general inorganic chemistry, followed by qualitative and quantitative analysis, metallurgical analysis, organic chemistry, inorganic preparations or the elements of manufacturing chemistry, sanitary analysis, advanced theoretical chemistry and a course of lectures on general applied chemistry, including a term each in the elements of metallurgy and ceramics.

In the engineering side, the requirements include mathematics, physics, drawing and shopwork. Besides the usual training in english, german is also compulsory on account of the large amount of chemical literature printed only in this language.

In the elective work opportunity is given to the student, under supervision of the head of the department, to frame his course according to the ultimate use to which he intends to put it. These electives begin in the second year and increase in amount as the student becomes more mature and better able to guage his purposes and abilities. In ordinary cases, where the student is fitting himself for some branch of chemical technology, he should elect further work in engineering, such as advanced mathematics, drafting, mechanics, strength of materials, machine design, thermo-dynamics, steam engineering, or applied electricity.

See also pages 49-50.

COURSE IN CHEMISTRY

NOTE – The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.
Chemistry (21) Physical Chemistry.	2.	Chemistry (21) Physical Chemistry.	2.	Chemistry (21) Physical Chemistry.	2.
German (5) Scientific Reading.	4.	German (5) Scientific Reading.	4.	German (5) Scientific Reading.	4.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Shopwork (7) Woodwork.	3.	Shopwork (11) Forging.	3.	Metallurgy (2) Mineralogy.	3.
Military Drill.		Military Drill.		Military Drill.	

Electives two to three hours throughout the year.

The following are suggested: Mathematics, Drawing, Agricultural Chemistry, Physiology, History, Economics.

THIRD YEAR

Chemistry (8) Organic.	5.	Chemistry (9) Organic.	5.	Chemistry (9) Organic.	5.
Metallurgy (5) Laboratory.	5.	Metallurgy (6) Assaying.	5.	Metallurgy (5) Laboratory.	5.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.

Electives five to eight hours throughout the year.

The following are suggested: Physical Laboratory, 3 to 5 hours; Geology, 5 hours — or Geology and Determinative Mineralogy, 5 hours; Shopwork, 3 hours; Agricultural Chemistry.

FOURTH YEAR

Chemistry (17) Inorganic Prep.	4.	Metallurgy (4) General.	5.	Chemistry (15) Sanitary.	4.
Metallurgy (4) Fuels and Iron.	5.	Chemistry (16) Applied.	3.	Ceramics (16) Applied.	3.
		Physiology (8) Bacteriology.	2.		

Electives to make the total work equal sixteen or eighteen hours, including Thesis work.

Students in Metallurgical Chemistry will take Ore Dressing the first term. For such students Chemistry (15, 16) and Physiology (8) will not be compulsory.

THESIS

COURSE IN CIVIL ENGINEERING

The field of the civil engineer comprises mensuration or surveying and also construction in its broad sense.

While many of its departments have grown into distinct professions, civil engineering, the parent stem, remains with more and larger opportunities than ever before.

As all the problems of the engineer involve the principles of the sciences, these form the ground–work of the course, and while mathematics is the foundation, occupying three years either alone or in its applications, physics, chemistry, geology and astronomy are each given an important place.

The technical work embraces instruction in free hand and mechanical drawing, surveying and map–making, steel bridges and buildings, masonry structures, roads, streets, railways, water–supply, sanitary engineering, the testing of structural materials, and the fundamentals of steam and electrical machinery.

The drawing extends practically through the entire four years. It is designed to fit men to take responsible positions as draftsmen.

The work in surveying includes three terms' work in the text–book and field work on the campus. At the end of the second year, and again at the end of the third year, the surveying classes are taken into camp in a rough country and devote their entire time to surveying. It is expected to fit young men for at once taking charge of field engineering corps.

Two terms' work is required in steel construction, the first being devoted to the computation of stress, and the second to the designing, detailing and drawing of roofs, bridges, buildings and other framed structures. The practice of the best bridge shops is followed. The term's work in masonry structures treats of building materials, abutments and piers, retaining walls, dams and masonry arches. Roads, street and railway construction and maintenance are treated at length in text books and lectures. A term is devoted to each of the subjects of water supply and sanitary engineering.

All through the technical work, frequent references are made to periodicals, transactions of engineering societies and other works on engineering, and the student required to become familiar with them.

The object sought in all the technical work is to give a thorough training in the theory of the subjects, to show how these are applied in practice and to give as much drill as possible in office and field methods.

See also pages 52–54.

COURSE IN CIVIL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Civil Eng. (1) Surveying.	6.	Civil Eng. (4) C. E. Drawing.	4.	Civil Eng. (2) Surveying.	6.
Military Drill.		Military Drill.		Military Drill.	

SUMMER COURSE

Civil Engineering (22) 4 weeks, of 6 days per week. Field work in land and railroad surveying.

THIRD YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Civil. Eng. (3) Topog. Surveying.	4.	Civil Eng. (24) C. E. Drawing.	5.	Civil Eng. (7) Bridge Stresses.	5.
Civil Eng. (16) Roads and Streets.	5.	Civil Eng. (6) Stereotomy.	4.	Drawing (7) Photography.	2.
Astronomy (4) Mathematical.	3.	Astronomy (5) Mathematical.	3.	Astronomy (6) Mathematical.	4.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.

SUMMER COURSE

Civil Engineering (23) 4 weeks, of 6 days per week. Field work in railroad and topographical surveying.

FOURTH YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Civil Eng. (8) Bridge Designing.	5.	Civil Eng. (17) Railways.	5.	Civil Eng. (18) Water Supply.	5.
Civil Eng. (15) Masonry.	5.	Civil Eng. (14) Cement Testing.	2.	Civil Eng. (10) Sanitary Eng.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.		
		Elec. Eng. (7) Laboratory.	2.		
		Mech. Eng. (17) Laboratory.	3.	Mech. Eng. (35) Laboratory.	5.
Geology (5) General.	5.	Geology (6) Economic.	3.		

THESIS

COURSE IN ELECTRICAL ENGINEERING

The object of this course is to give such training as shall enable the graduate to successfully take up practical work in those branches in engineering in which electricity plays the principal part. In general, the training needed for this purpose is the same as that of the Mechanical Engineer, except that the student need have only a general familiarity with other methods of power generation and utilization, and must, of course, make a very thorough study of the subject of electricity. Consequently, the first two years of the two courses are alike, except as regards shopwork and physics.

A considerable part of the first two terms of the third year is occupied by a thorough training in elementary electrical engineering measurement, such as currents, voltage, capacity, inductance, magnetic flux, etc. This work is given in the physical department (see Physics, Course 6, page 88). The third year also includes training in mechanics, mechanism, machine design, and strength of materials, the latter taught both in the class-room and in the laboratory. In the last term the study of steam machinery is commenced. Work on dynamo machinery is begun in the class-room in the second term, and followed up during the third term in the laboratory.

In the last year of the course, engines and boilers are studied during the first term in the class room, and during both the first and second terms in the laboratory. Instruction in electrical engineering forms the main part of the work of this year. It is carried on in the class-room, drawing room, and laboratory, and includes besides a thorough course in alternating current machinery, courses on power transmission and upon the applications of electricity. Throughout the whole of this year a part of the work is elective, and is chosen by the student subject to the approval of the head of the department. The end which is kept most in view, is the training of the student to think for himself, and to solve for himself the problems of the engineer.

Work in the class-room is done partly by text book and partly by lecture and recitation, preference being given to the former, where satisfactory books are available. The work is illustrated by the use of the projection lantern, diagrams and illustrative apparatus. Much stress is laid on the solution of numerical problems by the student. In the drawing room, designs are made of dynamo machinery of different kinds, transformers, house wiring, transmission, etc., the work here being as far as practicable based on the theoretical conclusions reached in the class and laboratory. The equipment is good and is increasing.

See also pages 62-66.

COURSE IN ELECTRICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (11) Forging.	2.			Physics (5) Laboratory.	4.
Rhetoric (3) Advanced	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Shopwork (4) Chipping, Filing.	2.	Shopwork (13) Machine Work.	3.		
Military Drill.		Military Drill.		Military Drill.	

THIRD YEAR

Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Physics (6) Laboratory.	5.	Physics (6) Laboratory.	5.	Mech. Eng. (32) Power Plants.	5.
Physics (4) Elect'y, Magnetism.	3.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng. (28) Laboratory.	2.
Shopwork (14) Machine Work.	3.	Elec. Eng (8) D. C. Mach.	4.	Ind. Arts (7) Mach. Design.	3.
Drawing (5) Technical.	3.			Elec. Eng. (9) Laboratory.	4.

FOURTH YEAR

Elec. Eng. (10) Alt. Current. Mach.	3.	Elec. Eng. (10) Alt. Current Mach.	3.	Elec. Eng. (13) Applications.	5.
Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (14) Designing.	4.	Elec. Eng. (14) Designing.	4.
Mech. Eng. (33) Engines and Boilers.	5.	Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (11) Laboratory, Thesis.	5.
Mech. Eng. (29) Laboratory.	3.	Elec. Eng. (12) Transmission.	2.		
		Mech. Eng. (30) Laboratory.	2.		
* Elective	3–5.	* Elective	3–5.	* Elective	3–5.

THESIS

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* Subject to the approval of the Professor of Electrical Engineering.

COURSE IN INDUSTRIAL ARTS

This course is designed for those who may desire to occupy positions in the various branches of manufacture, not as engineers, but as practical managers, superintendents or business men.

As the growth of engineering has brought about its subdivision into many special lines such as civil, mechanical, electrical, mining and chemical engineering, and established special training for each, so the increase in size, importance and scope of the manufactures of the country has made it desirable to especially train young men with reference to filling positions of trust and responsibility in them: to so educate them that they can readily learn the treatment or processes in any special line of manufacture and be able to intelligently superintend: and that they can initiate and put into successful operation new industrial enterprises, or extend and improve old ones.

With this idea in view this course has been planned to give the student special training along industrial and business lines, together with a certain amount of general culture. There will be found in the course a large amount of science training by which the processes of manufacture based upon these laws may be more readily understood: practice in the different shops and in drawing so that a good working knowledge of such operations may be acquired as well as training given to eye and hand, and power of observation and thought along mechanical lines developed: studies into the principles and methods governing the production of the chief materials of construction, the different mechanical movements and their combination in machinery, the use of materials in various constructions, electrical machinery and steam power plants, together with laboratory practice: also the relations of capital and labor, the problems of trade, and the conduct of business enterprises.

This course is well adapted to meet the needs of those young men already employed in industrial pursuits at the machine or bench, who are ambitious to advance to positions of greater responsibility and influence. This course offers an excellent opportunity to such men: it gives them four years of earnest work under good instructors to direct and assist personally, and the advantages of laboratory work to supplement the theoretical book-work. Those intending to take this course should first prepare themselves to meet the entrance requirements as given on page 103. Those unable to spend four years in this course will find on page 36 a short course requiring two years.

All choice of electives must be made in consultation with the head of the department and receive his approval.

See also pages 70-72, 92-94.

COURSE IN INDUSTRIAL ARTS

Note — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

First Term.	Credit hours	Second Term.	Credit hours	Third Term.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Economics (51) Elementary.	4.	Econom. (51 & 56).		Economics (56) Ind. and Soc. Ref.	2.
Military Drill.		Military Drill.		Military Drill.	

THIRD YEAR

Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping and Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Civil Eng. (21) Surveying.	3.
Economics (65) Commercial Geog.	2.	Economics (65).		Econom. (58 or 66)	2.
Econom. (55 or 57)	2.	History (56).		History (56) U. S. Political.	4.
		Econom. (55 or 57).			
		Econom. (58 or 66).			
		Mech. Eng. (22) Timber and Masonry.	3.		

FOURTH YEAR

Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Shopwork (17) Adv. Mach. Work.	3.
Polit. Science (53) Polit. Inst. of U. S.	3.	Polit. Science (53). Polit. Inst. of U. S.			
Elect. Eng. (6) Lectures.	2.	Elect. Eng. (6) Lectures.	2.	Mech. Eng. (32) Power Plants.	5.
Elect. Eng. (7) Laboratory.	2.	Elect. Eng. (7) Laboratory.	2.		
Industrial Arts (3) Shop Equipment.	3.	Industrial Arts (3) Shop Appliances.	3.	Industrial Arts (3) Shop Management.	3.
Industrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.
Mech. Eng. (28) Laboratory.	2.	Mech. Eng. (29) Laboratory.	2.	Mech. Eng. (30) Laboratory.	2.
		Thesis.		Thesis	3.

THESIS

COURSE IN MANUAL TRAINING

This course is designed for those students who wish to become teachers of manual training in the public schools of secondary grade or in the technical schools. Such manual training is based upon knowledge of the relation of the body and brain; its educational value is very great, and recognition of its importance is causing it to be put into more of the schools of the country each year. The advancement of manual training in the schools is retarded by one factor at least, and that is lack of teachers suitably trained to instruct in its different branches. This course is planned to meet this demand. It is necessary that a teacher of manual training in our public schools be of the same high standard as his associates, in character, general culture, uplifting influence. He must possess knowledge of the methods of instruction, ability in the art of teaching; and coupled with these he must have skill in his technical lines. He must be familiar with the tools, materials and processes used, and acquainted with the different effects on his pupils of the training and work with these. He must understand that enlarged power and ability in the student is what he is seeking; that the pupil himself, and not the inanimate objects used, is the real product of manual training.

As this course is a professional one, the studies found in it are those which will both broadly and specifically train for the end in view. There is a large amount of science work in physics and chemistry, which work is of importance on account of its fundamental character and the preparation it gives for teaching those subjects. The shopwork of the different kinds will furnish the necessary knowledge and the training of the hand, eye and brain; the drawing will give familiarity with that mode of expression of ideas. The industrial arts treat of mechanical movements and their application to machine tools. There is work in the subjects of electrical machinery and steam power plants that the teacher may be capable of dealing with the power used in his shopwork. The studies in the educational field will present the principles underlying education, the part which the different subjects have in the unfolding or development of the pupil, the laws of this development, so that he can deal intelligently with his pupils.

As the course is arranged the student completing the work will be ready for the teaching of manual training of the high school grade; of the drawing accompanying it; also of the science he may have chosen. Thus he may be able to accept a position in some school where manual training is not taught and can gradually introduce it as opportunity offers.

All choice of elective work must be made in consultation with the head of the department and receive his approval.

See also pages 70–72, 92–94.

COURSE IN MANUAL TRAINING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Mak'g.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Botany (9) Dendrology.	2.	Drawing (12) Clay Modeling.	2.	Drawing (12) Clay Modeling.	2.
Military Drill.		Military Drill.		Military Drill.	

THIRD YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.
Chemistry (21) Physical.	2.	Chemistry (21) Physical	2.	Chemistry (21) Physical	2.
or		or		or	
Physics (5) Laboratory.	5.	Physics (5) Laboratory.	5.	Physics (5) Laboratory.	5.
Education (51) Elem. Psychology.	4.	Education (51).		History (56) U. S. Political.	4.
		History (56).			

FOURTH YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Mech. Eng. (32) Power Plants.	5.
Elect. Eng. (6) Lectures.	2.	Elect. Eng. (6) Lectures.	2.	Mech. Eng. (28) Laboratory.	2.
Elect. Eng. (7) Laboratory.	2.	Elect. Eng. (7) Laboratory.	2.		
Polit. Science (53) Polit. Inst. of U. S.	3.	Polit. Science (53).			
Education (59) Child Study.	2.	Education (59 & 52).		Education (52) Modern Theories.	4.
Education (67) Educ. Values.	2.	Education (67 & 58).		Education (58) Philosophy.	4.
Electives	2–5.	Electives	2–5.	Thesis	5.

THESIS

COURSE IN MECHANICAL ENGINEERING

Mechanical Engineering deals principally with the generation of power or effective energy from the forces of nature and the utilization of this power through mechanical devices. The fundamental science underlying this profession is physics, especially that part of physics relating to mechanics and heat, though mathematics is the medium by which these physical principles are made applicable to practical problems.

The training given in the course is designed to equip men with such general and technical knowledge, that they can enter at once and with equal ease into positions in any of the numerous subdivisions of mechanical engineering, and adapting themselves to the needs of the situation, can rapidly acquire the experience which is essential to that particular work. And at the same time it must be noted that no one lacking this broad preliminary view of the profession as a whole, can ever expect to attain the highest skill in any one of its specialties.

The technical work of the course begins with physics, which is taught by a year's text book course, supplemented by two terms of laboratory work. This is followed in turn by mechanics, mechanism, the strength of materials, bridge stresses, machine design, thermodynamics, prime movers, steam boilers, shop appliances, hydraulic machinery, and the metallurgy of fuel, iron and steel.

The theoretical principles of these subjects cannot be made real and practical to the student except by an extended system of laboratory courses. Three such are provided, in shopwork, drawing and experimental engineering, respectively. The shopwork course trains the student in those handicrafts in constant use in all mechanical industries, viz., forging, chipping and filing, carpentry, pattern-making, foundry work, and the use of the principal metal-working machine tools.

The course in drawing includes free hand drawing, lettering, projection, descriptive geometry, shades, shadows and perspective and technical drawing, all leading up to the three terms of machine design which teach the student to use this drawing as one of the important tools of his profession.

The experimental engineering, coming in the last year of the course, gives the student opportunity to gain familiarity with boiler tests, determinations of the efficiency of steam power-plants, gas engines, hydraulic and refrigerating machinery, measurements of friction, losses of power in transmission, and many other important technical problems, and is of the greatest use to the student in enabling him to face practical work with confidence in himself.

See also pages 74-79.

COURSE IN MECHANICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Shopwork (11) Forging.	3.	Physics (7) Laboratory.	2.	Physics (7) Laboratory.	3.
Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.
Shopwork (3) Foundry.	2.	Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.
Military Drill.		Military Drill.		Military Drill.	

THIRD YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5
Mech. Eng (12) Laboratory.	2.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng. (3) Mechanism.	2.
Drawing (5) Technical.	3.	Mech. Eng. (22) Timber, Masonry.	3.	Drawing (7) Photography.	2.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Civil Eng. (19) Truss Stresses.	5.
Shopwork (14) Machine Work.	3.	Shopwork (15) Adv. Mach. Work.	4.	Mech. Eng. (32) Power Plants.	5.
Mathematics (11) Diff. Equations.	1.				

FOURTH YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mech. Eng. (33) Engines and Boilers.	5.	Mech. Eng. (34) Thermodynamics.	5.	Mech. Eng. (19) Machine Design.	5.
Mech. Eng. (27) Laboratory.	5.	Mech. Eng. (14) Laboratory.	4.	Mech. Eng. (15) Laboratory.	3.
Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (21) Thesis.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Industrial Arts (5) Shop Appliances.	3.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.	Mech. Eng. (31) Hydraulic Machinery.	3.

THESIS

COURSE IN MINING ENGINEERING

The profession of mining engineering is peculiar in the wide range of work it covers. It involves two distinct fields: that of the engineer, presented in the locating, exploiting and operating of mining properties, and that of the chemist and metallurgist in the reduction of ores and the treatment of fuels, as in coke manufacture. A man may devote himself largely to either of these departments, but a competent understanding of both is essential to the successful designing and development of mining or metallurgical plants.

The course preparatory to such a profession must be a broad one, including a thorough training in general science, especially chemistry, mathematics, mineralogy and geology, as well as in the use of english and, as far as possible, foreign languages.

With this as a foundation there must be given special instruction in the arts which are related particularly to mining, and metallurgy, and which usually furnish the first employment to the graduate, such as drafting, surveying, technical chemical analysis and assaying. Experience has shown that these subjects can be so taught in college as to enable a man to be of use in the industry during the time in which he is acquiring that experience and judgment which are essential to his ultimate success.

Finally the advanced work of the profession must be fully treated. Such work naturally occupies the later years of the course, being necessarily proceeded by the mathematics and the general science training. The course which follows has been framed on these general principles.

The third year is largely devoted to special professional studies. The work in metallurgy is extended and developed in special lectures on the metals, their properties and reduction, fuel, furnaces, refractory materials and the principles of slag formation and furnace charging. Fire assaying of gold, lead and silver ores is taught practically.

The engineering side of the course is developed in this year by training in the principles of construction, as given in mechanics, strength of materials and truss stresses. Surveying is taught by lectures, recitations and extended field practice.

In the fourth year of the course the problems of mine engineering and metallurgical constructions are developed in lectures covering the theory and practice of mine development and operation, furnace construction and design, etc., and are supplemented by practical work in the drafting room and by visits to accessible mines and metallurgical works for study and comparison.

See also pages 80–86.

COURSE IN MINING ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department A full description of department work follows this statement of Courses.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.
Shopwork (7) Woodwork.	2.	Shopwork (11) Forging.	2.	Shopwork (4) Chipping, Filing.	2.
Military Drill.		Military Drill.		Military Drill.	

THIRD YEAR

Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) General.	5.	Metallurgy (3) Deter. Mineralogy.	5.
Mine Eng. (4) Mine Surveying.	5.	Metallurgy (6) Assaying.	5.	Civil Eng. (19) Truss Stresses.	5.
Rhetoric (3) Advanced	2.	Rhetoric (3) Advanced.	2.	Rhetoric (3) Advanced.	2.

FOURTH YEAR

Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.
Geology (5) General.	5.	Geology (6) Economic.	3.	Mech. Eng. (35) Laboratory.	5.
Metallurgy (8) Ore Dressing.	2.	Metallurgy (7) Metal Construction.	3.	Mine Eng. (6) Plans and Specifications.	5.
Elect. Eng. (6) Lectures.	2.	Elect. Eng. (6) Lectures.	2.	Drawing (7) Photography.	2.
Elect. Eng. (7) Laboratory.	2.	Elect. Eng. (7) Laboratory.	2.		
		Geology (7) Petrography.	2.		

THESIS

Courses not Leading to a Degree

The following short courses are offered by the University, in the belief that they will meet the needs of a large class of young men who for any reason will not or cannot obtain the benefits of the thorough courses already described. The University recognizes that there are many valid reasons which may stand in the way of some, whose ability to receive and use the highest forms of education is without question, and it is thought that in extending opportunities for such training as will be available to these young men, the University is filling a longfelt want in the scheme of engineering education and is certain to grow into closer contact with the industrial life of the State.

To those who complete these courses no diploma is given, but a certificate is issued stating the list of studies which the student has taken in his course, and in which his work has been satisfactory.

The requirements for admission to these short courses are very much lower than for admission to regular collegiate work. It is clear that to reach the young men for whom these courses have been designed, it is necessary that the conditions of admission and attendance shall be shorn of every complication and that the opportunity extended shall be within the grasp of all, and with the minimum of formality or restriction. It is considered, however, that those who accept these opportunites are men, mature in character and steadfast in their purpose to gain sufficient technical education for their needs, and who are making a sacrifice of time at an age when time has begun to be precious.

The somewhat elementary character of some of the work of these courses may attract the attention of some, who as candidates for admission to regular collegiate work could not be admitted on account of insufficient preparation. To all such students it is proper to state that these courses are in no sense designed as preparatory schools for those who desire ultimately to enter college, and it is not the purpose of the college to permit such use to be made of them. Therefore, every candidate for admission to the short courses, will be expected to satisfy the commitee on Entrance that his previous experience will enable him to utilize this opportunity in a proper way.

SHORT COURSE IN CLAY-WORKING

The two-year or industrial course is designed to assist young men who have already been actively engaged in the Ceramic industries, and who, on account of mature years, or lack of means, or lack of previous educational advantages, are unable to avail themselves of the full and complete course, and yet who wish to increase their earning power or chances of promotion by fitting themselves for other than routine labor. The requirements for admission to this course are very low, and the work required throughout is much less severe than that of the four-year course; in fact, anyone who is willing to really apply himself, can retain his membership in this class, but there is no place for any but those who are thoroughly in earnest, and poor work will not be accepted from those who are able to do good work.

In short, in this industrial course, the department recognizes its closest medium of communication with the wants of the clay industries, and it is intended to so maintain this course as always to render the greatest good to the greatest number.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (7) Inorganic.	5.	Chemistry (7) Inorganic.	5.	Chemistry (12) Analytical.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Mathematics (1) Algebra.	5.	Mathematics (3*a*) Geometry.	5.	Shopwork (11) Forging.	3.
				Shopwork (4) Chipping, Filing.	2.
Military Drill.		Military Drill.		Military Drill.	

SECOND YEAR

Ceramics (1) Chem. Analysis.	5.	Ceramics (2) Analysis of Clays.	5.	Ceramics (3) Analysis of Glazes.	5.
Ceramics (4) Gen. Principles.	5.	Ceramics (5) Brick.	5.	Ceramics (6) Pottery.	5.
Geology (5) General.	5.	Geology (6) Economic.	3.	Drawing (11) Mechanical.	5.
		Drawing (1) Freehand.	2.		
Military Drill.		Military Drill.		Military Drill.	

See also pages 44-48.

SHORT COURSE IN INDUSTRIAL ARTS

This course is primarily designed to extend the benefits of the same kind of training as that given in the four-year course in this subject to that class of young men who may be unable for any reason to undertake a course of four years' duration, but who aspire to become actively engaged in factory work. It has been the aim to give, in as condensed a form as possible, those studies which will most rapidly and easily be turned to practical account in manufacturing operations; such as drawing, shop-work, use of machine tools, etc., together with a grounding in the physics and mathematics which underlie these operations.

The course will be found most valuable to young men already engaged in factory work, who find themselves limited from rising in their work on account of lack of technical education.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.
Drawing (8) Geometric.	2.	Drawing (8) Projections.	2.	Drawing (2) Lettering.	2.
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Plane Geometry.	5.	Mathematics (13) Space Geometry.	5.	Mathematics (14) Trigonometry.	5.
Shopwork (7) Pattern Making.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (11) Forging.	3.
Military Drill.		Military Drill.		Military Drill.	

SECOND YEAR

Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Shopwork (3-4) Foundry, Filing.	5.	Shopwork (13) Machine Work.	5.	Shopwork (15) Adv. Mach. Work.	5.
Military Drill.		Military Drill.		Military Drill.	

See also pages 70-72, 92-94.

SHORT COURSE IN MINING

The short course in mining is especially designed for young men who have had practical experience in mines, and wish to study mine surveying, drafting, the problems of ventilation, drainage, haulage, mine operating, etc., and also something of the sciences bearing upon their work, but have neither the time nor the preparation for a full college course. The first year is devoted to a thorough study of the elementary mathematics and sciences necessary to prepare the student for the practical work of the second year. The experience of the past thirteen years has shown beyond any doubt that any enterprising young miner can master the subject sufficiently well in the time assigned to materially increase his earning capacity and chances for promotion in his occupation.

Personal instruction is given, and it is made thoroughly practical and of such a character as to best adapt it to the needs of the individual student.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Geometry.	5.	Mathematics (13) Geometry.	5.	Mathematics (14) Trigonometry.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Military Drill.		Military Drill.		Military Drill.	

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (1) Freehand.	2.	Drawing (4) Drafting.	3.	Drawing (2) Lettering.	2.
Drawing (3) Projections.	3.	Geology (4) Elementary.	5.	Metallurgy (9) Mineral Chemistry.	5.
Chemistry (7) Inorganic.	5.	Chemistry (13) Laboratory.	3.	Shopwork (11) Forging.	3.
Mine Eng. (1) Mine Surveying.	5.	Mine Eng. (2) Ventilat., Haulage.	5.	Mine Eng. (3) Mine Operating.	5.
Military Drill.		Military Drill.		Military Drill.	

☞ See also pages 80–86.

MECHANICAL DRAWING ROOM

FREE HAND DRAWING ROOM

DEPARTMENTS OF INSTRUCTION

ARCHITECTURE

(DEPARTMENT OF DRAWING)

Office, Hayes Hall, Room 22

Professor Bradford

This work is carried on in the rooms of the Department of Drawing, occupying the third floor of Hayes Hall. The material equipment, in addition to that of the Department of Drawing, consists of models in plaster and wood illustrating the constructive and ornamental forms of the different styles of architecture, a collection of architectural photographs and lantern slides, architectural drawings and specifications of erected structures, a collection of plates of architectural forms and ornament, samples of material used in constructive work, instruments for experimental work in heating and ventilating, such as anemometers, weather bureau hygrometers, carbonic acid testers and thermometers. The heating apparatus of the several buildings of the University provide valuable material for this work.

The many and varied architectural structures being continually erected in the city of Columbus which the students can visit and inspect, furnishes very valuable material of a practical nature which cannot be overestimated.

The library contains very valuable technical and historical architectural literature.

4. **Specifications.** Lectures and practice in preparing Specifications for Architectural Structures. Two periods a week. (Second Term, fourth year, Course in Architecture.)

5. **Decoration and Ornament.** Lectures on the different styles of carved ornament and decorative color. The practice part of this subject will be incorporated in the clay Modeling and Designing. Three periods a week. (First Term, third year, Course in Architecture.)

6. **Estimates and Superintendance.** Lectures and practice in preparing estimates for structures designed in Courses 8, 11, 12 and 13, and the duties of superintendence. Four periods a week. (Third Term, fourth year, Course in Architecture.)

7. **Heating, Ventilating and Plumbing.** Lectures and experimental work. Lectures on the principles and methods of heating and ventilating and sanitary plumbing. Experimental work is carried on with the heating and ventilating plants in the different University buildings. Five periods a week. (Second Term, fourth year, Course in Architecture.)

8. **Designing.** Lectures and Practice. Steel skeleton and fire proof construction. Five periods a week. (Second Term, fourth year, Course in Architecture.)

9. **History of Architecture.** Lectures illustrated by lantern slides. Three periods a week. (First Term, second year, Course in Architecture.)

10. Same as 9. (Second Term, second year, Course in Architecture.)

11. Same as 10. (Third Term, second year, Course in Architecture.)

12. **Architectural Drawing.** Drawing architectural ornament, details of orders and styles with the special object of impressing upon the student's mind the architectural characteristics considered in Course 9. Two periods a week. (First Term, second year, Course in Architecture.)

13. Same as 12. (Second Term, second year, Course in Architecture.)

14. Same as 12. (Third Term, second year, Course in Architecture.)

15. **Designing.** Lectures and practice in designing structures adapted to modern requirements. Four periods a week. (First Term, third year, Course in Architecture.)

16. **Designing.** Lectures and practice. Two periods a week. (Second Term, third year, Course in Architecture.)

17. **Designing.** Lectures and practice. Four periods a week. (Third Term, third year, Course in Architecture.)

18. **Designing.** Four periods a week. (First Term, fourth year, Course in Architecture.)

19. **Designing.** Four periods a week. (Third Term, fourth year, Course in Architecture.)

20. **Thesis.** Original design, to be accompanied with written description, specifications and estimate. Five periods a week. (Third Term, fourth year, Course in Architecture.)

ASTRONOMY

Office, Emerson McMillin Observatory

Professor H. C. Lord

The importance of a practical knowledge of the methods of astronomical observation to Civil Engineers made the establishment of the Emerson McMillin Observatory a very important advantage to the College of Engineering. The instructions given to the Engineering students includes the use of this fine equipment in practical work under the immediate supervision of the Director.

The building and its equipment is the gift of Mr. Emerson McMillin, of Columbus, Ohio, and was built during the summer of 1895. The first floor is divided by a hall and stairway into two parts. The east wing contains an office, library, clock room and a large, well lighted room furnished with tables for the students, where they reduce their observations and keep the records of their work. The west wing contains the transit house, the dome and photographic dark room. The transit house is a light frame structure, so designed as to be kept as free as possible from heat radiated by any heavy wall of masonry. The dome is a wooden framework covered on the outside with canvas.

The equipment consists of a twelve-inch equatorial telescope, mounting by Messrs. Warner & Swasey, objective by Mr. Brashear, with a large and powerful spectroscope by Mr. Brashear. This instrument is adapted to use either one or two prisms or a grating, and is provided with a double set of objectives, one corrected for the visual and one for the photographic rays; a position micrometer with a seven-inch circle by Messrs. Warner & Swasey; a combined zenith telescope and transit instrument of three inches clear aperture by Mr. G. N. Saegmuller; a sidereal clock by Clemens Riefler, of Munich; a comparater by Carl Ziliss; a four-inch portable equatorial by Alvin Clark; a chronograph by Warner & Swasey; sextants, chronometers, meteorlogical instruments, etc. There is also provided a spectroscopic laboratory, equipped with a Brashear concave grating spectroscope, a two-horse power gas engine and dynamo; a storage battery, and a large induction coil. In addition to the above, Mr. McMillin's gift provides for an excellent astronomical library.

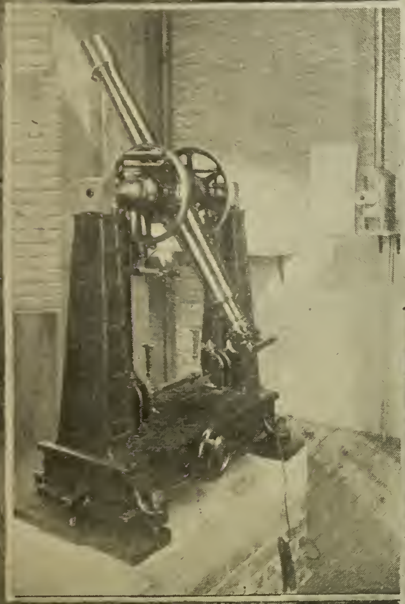
4. **Astronomy, Geodosy and Least Squares.** Lectures on practical Astronomy, supplemented by practice with the instruments of the Emerson McMillin Observatory. Text-book, Doolittle. Three times a week. (First Term, third year, Course in Civil Engineering.)
5. Continuation of 4. Three times a week. (Second Term, third year, Course in Civil Engineering.)
6. Continuation of 5. Four times a week. (Third Term, third year, Course in Civil Engineering.)

BOTANY

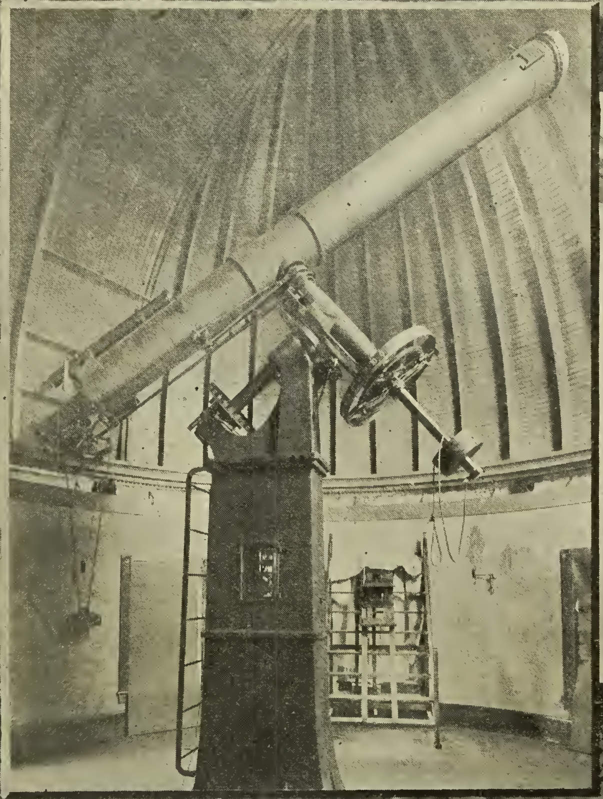
Office, Botanical Hall

Professor Kellerman

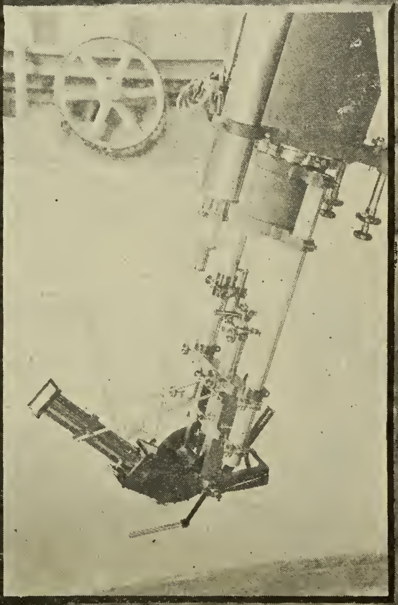
9. **Dendrology.** Lectures, field and laboratory work. Twice a week. (First Term, second year, Course in Manual Training.)



TRANSIT



12-INCH TELESCOPE



SPECTROSCOPE

CERAMICS

(DEPARTMENT OF CLAY WORKING AND CERAMICS)

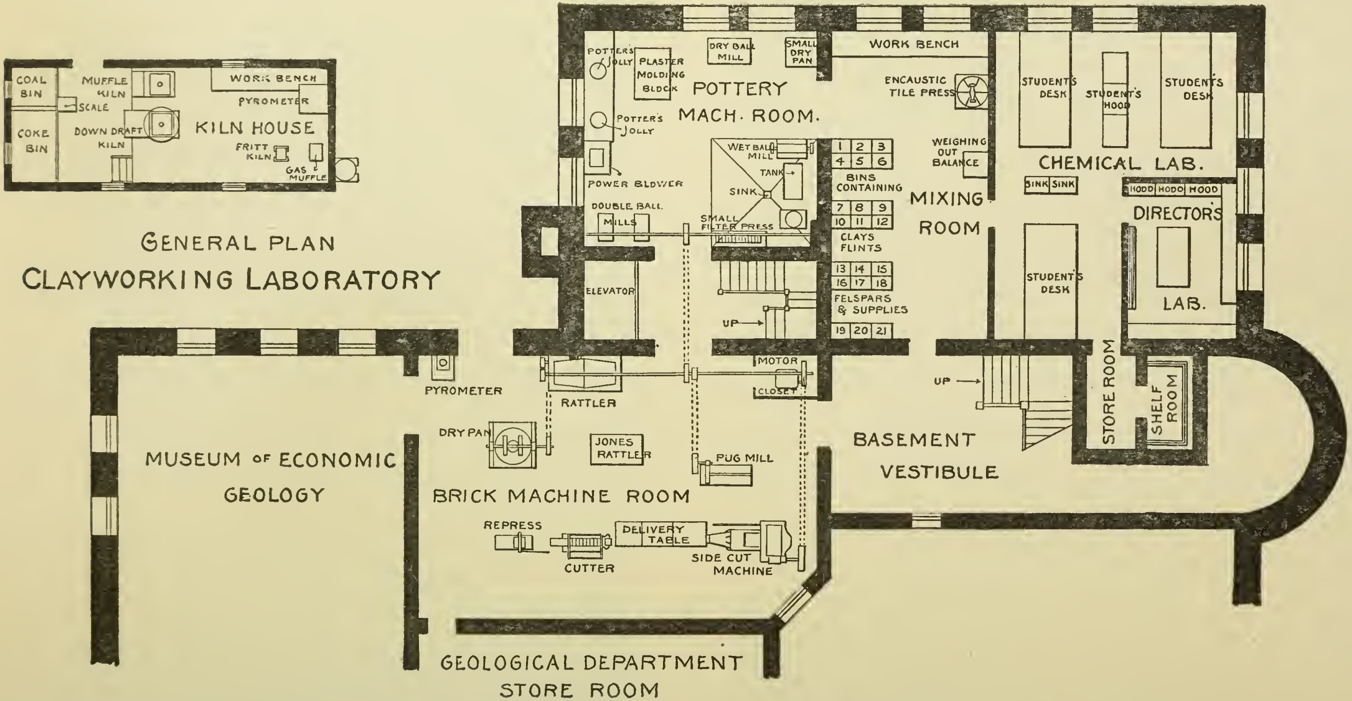
Office, Orton Hall, Room 18.

Professor Edward Orton, Jr., Mr. Bleininger

The facilities of the Department for study in the field of clay working comprise: 1st. A convenient chemical laboratory, specially designed and equipped for the analysis and decomposition of silicates. Provision has been made for the use of hydrofluoric acid with safety, and the platinum ware has been made to order with this purpose in view. 2d. A complete mechanical outfit for the preparation of clays for pottery manufacture and the production of the ware itself, of any grade from earthen wares to porcelain. The machinery is of the latest types and comprises all important varieties in use for grinding, tempering, washing, filtering and molding. 3d. A similar plant for the manufacture of brick, tiles, pipes and hollow goods. The machinery here is of full size and samples up to a ton in weight can be received and transformed into the finished articles by any or all of the standard methods in commercial use. The power for this purpose is derived from a fine electric motor, driven from the University power plant. 4th. A kiln house, equipped with a kiln in which several hundred bricks, or an equivalent quantity of sewer-pipe, stoneware, or pottery can be burnt. The fuel is intended to be coke, except in special cases where the fuel available for burning clay wares is to be made the subject of test. There is also provided a crucible melting furnace and a muffle furnace for testing glazes. A muffle kiln of larger size for burning pottery, glazed ware and decorated wares has recently been put into operation. 5th. A ceramic museum, containing a collection of American pottery and clay products of every class, is in process of installation. 6th. A library of the best literature on the subject, mainly German, but containing a few English and French works, and the trade periodicals.

The facilities of the Department for study in the field of cement and mortar materials comprises, in addition to the foregoing plant, much of which is especially well suited to this purpose, the following special apparatus. 1st. An improved dry-ball-mill, of chilled iron for grinding the raw material together, and for grinding the cement clinker. 2d. A small cupola, fired with coke and using air blast, for the vitrification of the refractory silicates used. 3d. Access to the complete and well appointed cement testing laboratory of the Department of Civil Engineering.

These facilities permit the Department to offer exceptional opportunities to any who wish to specialize in this important field of manufacture.

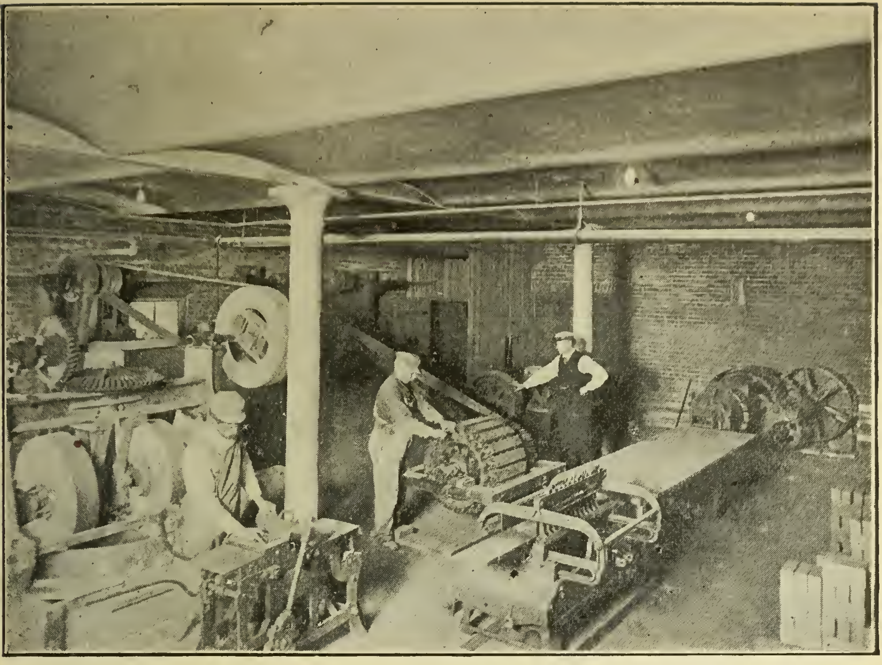


GENERAL PLAN
CLAYWORKING LABORATORY

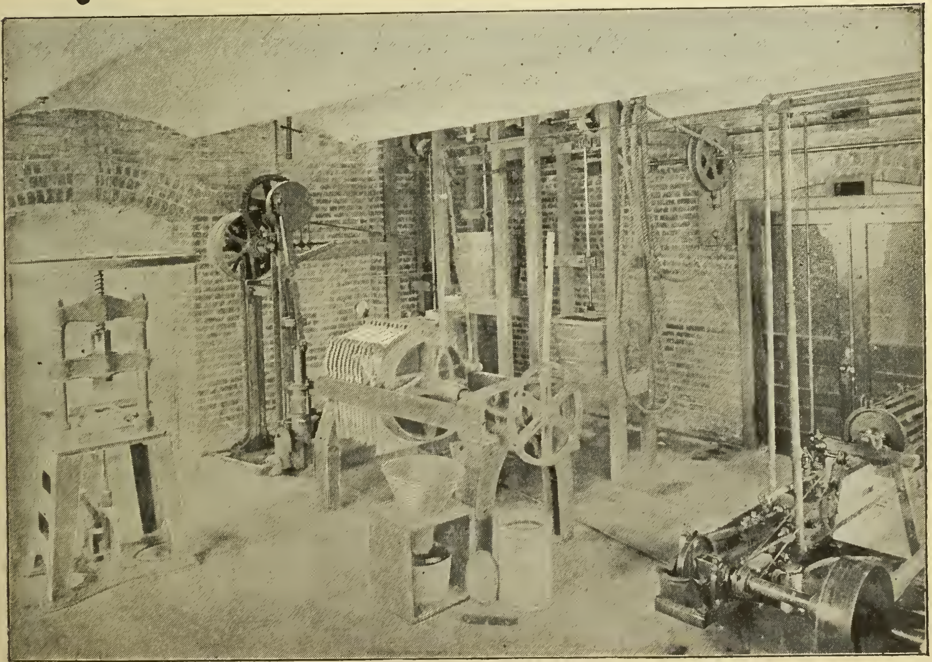
1. **Ceramic Chemistry.** This course is open only to those who have Completed General Chemistry 12. The student begins the quantitative analysis of salts and chemicals, and later works on limestone and other easy materials. Five times a week. (First Term, second year, Course in Ceramics and Short Course in Clay-working.)
2. Continuation of Course 1. The student begins the quantitative analysis of clays and complex minerals, working first on samples of known composition, and later on unknown materials. Five times a week. (Second Term, second year, Course in Ceramics and Short Course in Clay-working.)
3. Continuation of Course 2. The student completes the ultimate analysis of clays and begins the proximate or "Rational" analysis of clays and pottery bodies, following the methods of Seger. Five times a week. (Third Term, second year, Course in Ceramics and Short Course in Clay-working.)

4. **Lectures on Clay Manufacture** (supplemented by frequent recitations). The origin, composition and properties of clays and other minerals employed in the clay, glass and cement industries. Five times a week. (First Term, third year, Course in Ceramics; and second year, Short Course in Clay-Working.)
5. Continuation of Course 4. A series of lectures, with recitations, on the general principles of the manufacture of bricks and the coarser clay wares, including the selection and winning of the materials, their preparation, manufacture, burning and testing. Five times a week. (Second Term, third year, Course in Ceramics; and, second year, Short Course in Clay-working.)
6. Continuation of Course 5. A series of lectures, with recitations, on the classification and manufacture of pottery and the finer grades of clay wares, including the selection of the materials, preparation of the bodies, manufacture of the ware, preparation of the glazes, burning and decoration of the wares and the pyrometry of ceramics. Five times a week. (Third Term, third year, Course in Ceramics; and, second year, Short Course in Clay-working.)

7. **Ceramic Chemistry.** Continuation of Course 3. Open only to those who have completed that course. The analysis of glasses and glazes, devoting special attention to the use of hydrofluoric acid in silicate analysis, and to the determination of lead and boracic acid. Five times a week. (Second Term, third year, Course in Ceramics.)



BRICK-MAKING LABORATORY



POTTERY-MAKING LABORATORY

9. **Laboratory Work in Ceramics.** Open only to those who have completed Courses 3 and 6. The student will undertake the production of such wares as are made from single clays; then wares made by blending two or more natural clays; and, then, such wares as are made from an artificial body. In each case the bodies made will be burnt and tested. Five times a week. (First Term, fourth year, Course in Ceramics.)

10. Continuation of Course 9. The student will practice on the production of glasses and glazes, beginning with the natural "slip glazes" and taking successively the soft raw-lead glazes, the fritted lead-boracic-acid glazes, and the hard-fire leadless porcelain glazes. In each case the glazes will be made for use on some definite body, and will be made to "fit." Five times a week. (Second Term, fourth year, Course in Ceramics.)

11. Continuation of Course 10. The student will practice on the use of the coloring and opacifying oxides in glazes, and on the production of colors for the decoration of pottery, and of body-stains. Five times a week. (Third Term, fourth year, Course in Ceramics.)

12. **Lectures on Cement Manufacture.** The theory of hydraulicity, the compounding, manufacture and testing of natural and Portland cements and hydraulic silicates. Open to students who have had courses 3 and 6. Facilities for laboratory work in making, burning and testing cements will be given. Five times a week. (Second Term, fourth year, Course in Ceramics.)

14. **Mineral Reports.** A series of lectures on the prospecting and opening of mineral properties and ceramic plants. Frequent trips will be made to the important clay-working centers of Ohio for field work and practice in observation. Students will be allowed to specialize along their intended lines. Five times a week. (Third Term, fourth year, Course in Ceramics.)

15. **Thesis.** See requirements for graduation, page 107.

16. **General Principles of Applied Ceramics.** A series of lectures on the chemical technology of the clay, glass and cement industries. Three times a week. (Third Term, fourth year, Course in Chemistry.)

17. **Practice** in making drawings and specifications for brick kilns, brick dryers, pottery kilns, gas producers, glass pot-furnaces, glass tanks, cement kilns and burning cylinders. Students will be allowed to specialize along the lines they intend to follow. Four times a week. (Second Term, fourth year, Course in Ceramics.)

CHEMISTRY

Office, Chemical Hall, Room 20

Professor McPherson, Professor Norton, Assistant Professor Henderson, Mr. Kohr, Mr. Gore

The laboratories of the Department accommodate three hundred and eighty-five students. The general lecture room is large and well lighted, and all needed facilities are provided for the full experimental illustration of the lecture courses. The Department is supplied with the best apparatus and materials for both lecture and laboratory work, and has also a growing collection of specimens illustrating the application of chemistry to the arts.

Chemical Hall is occupied by the Departments of Chemistry, Mining, Metallurgy, and Pharmacy. The buildings and contents have cost about sixty-two thousand dollars. It is two stories in height, with a basement. It is built of pressed brick laid in red mortar. At the entrance is a large loggia, and beyond this is a vestibule opening into the main hall.

The Department of Chemistry occupies the middle and western portion of the second floor and the middle portion of the first floor. The main lecture room has a seating capacity of one hundred and fifty persons. The laboratory of elementary chemistry accommodates three hundred students. The qualitative laboratory contains desks for twenty students. The quantitative laboratory, on the first floor, is the same size as the laboratory of elementary chemistry, and has accommodations for fifty students. Besides these, there is a laboratory for organic chemistry, with desks for fifteen students, a room for combustions, a room for the preparation of experiments, a balance room, a room for working with foul gases, one for spectroscopic work, one for rough work, one for books, three private laboratories and an office.

7. **Elementary Chemistry.** Inorganic. Lecture, Laboratory and Quiz. Laboratory work; First Term, experiments upon the non-metals; Second Term, principles of qualitative analysis. Five times a week. (First and Second Terms, first year, all four-year courses and Short Course in Clay-working; and First Term, second year, Short Course in Mining.)

8. **Organic Chemistry.** Lectures. Five times a week. (First Term, third year, Course in Chemistry.)

9. **Organic Chemistry.** Laboratory. Five times a week. (Second and Third Terms, third year, Course in Chemistry.)

12. **Qualitative Analysis.** Five times a week. (Third Term, first year, Courses in Ceramics, Chemistry and Industrial Arts, and Short Course in Clay-working.)

13. **Qualitative Analysis.** Three laboratory periods a week. (Second Term, second year, Short Course in Mining.)

15. **Sanitary Analysis.** Laboratory and lectures. A study of the most important chemical methods for the analysis of water and air. Four times a week. (Third Term, fourth year, Course in Chemistry.)

16. **Applied Chemistry.** Lectures on Industrial Chemistry. These are made as practical as possible by visits to different chemical works. When possible specialists deliver lectures on subjects belonging to their particular line of work. Three times a week. (Second Term, fourth year, Course in Chemistry.)

17. **Inorganic Preparations.** Four times a week. (First Term, fourth year, Course in Chemistry.)

20. **Quantitative Analysis.** Laboratory, lectures and recitations. Use of the balance and general principles of gravimetric analysis. Drill in the solution of problems in quantitative analysis; study of properties of precipitates; principles of volumetric analysis. Selections are made from such analytical methods as best meet the needs of the students. The samples used for analysis are mixtures or commercial products, the percentage composition of which is not made known to the student until he has reported his own results. Four times a week. (First, Second and Third Terms, second year, Course in Chemistry.) (Chemistry 20 and 21 alternative with Physics 5, First, Second and Third Terms, third year, Course in Manual Training.)

21. **Advanced General Chemistry.** Physical Chemistry. This course includes (*a*) a general survey of the arrangement of the elements in accordance with the periodic law, and (*b*) a discussion of the main principles of physical chemistry and their application to general chemical processes. Twice a week. (First, Second and Third Terms, second year, Course in Chemistry.) (Chemistry 20 and 21 alternative with Physics 5, First, Second and Third Terms, third year, Course in Manual Training.)

For courses in the technical analysis of iron, steel, ores, fuels, fluxes, clays, etc., see the Departments of Metallurgy and Ceramics.

CIVIL ENGINEERING

Office, Hayes Hall, Room 13

Professor Brown, Assistant Professor Sherman, Mr. Groves.

The facilities provided for the illustration of and practical training in the Courses in Civil Engineering are as follows: One high grade and three ordinary transits, three leveling instruments, solar compass, prismatic compass, improved telescope compass, Abney hand level, level and stadia rods, sight poles, chains, tapes; twenty-six improved drawing tables with 30″ by 36″ top; Schroeder's models in stereotomy and roof trusses; large set of models of wooden joints; collection of photographs of bridges both when finished and in course of erection; collections of strain sheets and shop drawings of bridges, new improved cement testing machine and outfit for making all kinds of cement tests; stone mason's tools for working models out of plaster blocks; magic lantern and slides; calculating machines; sets of drawing instruments; blue-print room with outfit; set of tracings of standard structures from which each student makes a set of blue-prints. The equipment is growing each year by the addition of materials purchased, presented, or made by students of the Department.

1. **Land Surveying.** Recitations and field work. Johnson's Theory and Practice of Surveying. Six times a week. (First Term, second year, Course in Civil Engineering.)

2. **Railroad Surveying.** Recitations and field work. Searle's Field Engineering. Six times a week. (Third Term, second year, Course in Civil Engineering.)

3. **Topographical Surveying.** Lectures, field work and drawing. Johnson's Surveying used for reference. Four times a week. (First Term, third year, Course in Civil Engineering.)

Topography. Platting, pen and tinted work. Reed's Topographical Drawing and Sketching. Four times a week. (Second Term, second year, Course in Civil Engineering.)

6. **Stereotomy.** Recitations, drawing and model cutting. Warren's Stereotomy. Four times a week. (Second Term, third year, Courses in Architecture and Civil Engineering.)

7. **Bridge Strains.** Recitations and lectures. Part I of Dubois's Stresses in Framed Structures. Five times a week. (Third Term, third year, Course in Civil Engineering.)

8. **Bridge Designing.** Lectures and drawing. Part II of Dubois's Stresses in Framed Structures and Johnson's Modern Framed Structures used for reference. Five times a week. (First Term, fourth year, Course in Civil Engineering.)

CLASS IN SURVEYING

10. **Sanitary Engineering.** Lectures. Five times a week. (Third Term, fourth year, Course in Civil Engineering.)

14. **Civil Engineering Laboratory.** Cement testing, adjustment of instruments. Twice a week. (Second Term, fourth year, Course in Civil Engineering.)

15. **Masonry Construction.** Recitations and lectures. Baker's Masonry Construction. Five times a week. (First Term, fourth year, Courses in Architecture and Civil Engineering.)

16. **Highways.** Recitations and Lectures. Byrne's Roads and Streets. Five times a week. (First Term, third year, Course in Civil Engineering.)

17. **Railway Location.** Recitations and lectures. Wellington's Economic Theory of Railway Location. Five times a week. (Second Term, fourth year, Course in Civil Engineering.)

18. **Water Supply.** Recitations and lectures. Five times a week. (Third Term, fourth year, Course in Civil Engineering.)

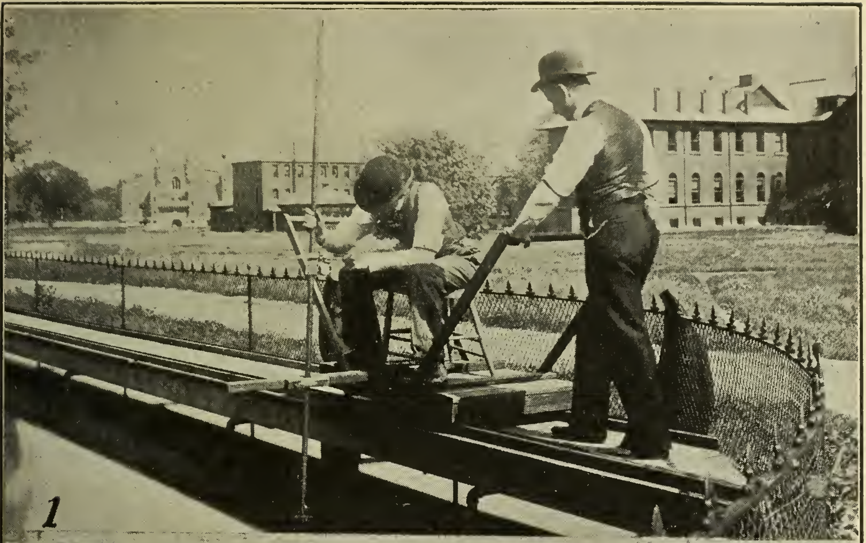
19. **Trusses.** Lectures and drawing. Five times a week. (Third Term, third year, Courses in Architecture, Mining and Mechanical Engineering.)

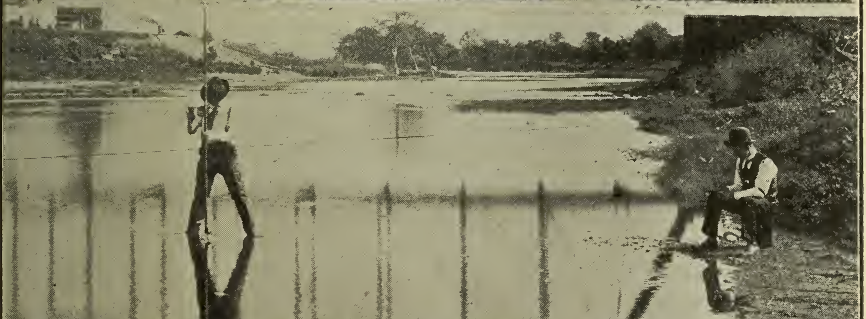
21. **Surveying.** Recitations and field work. Davies' Surveying. Three times a week. (Third Term, third year, Course in Industrial Arts; and, fourth year, Course in Architecture.)

22. **Summer Course in Field Work.** The students are taken into camp in a rough, broken country and given a thorough drill in land and elementary railroad surveying. The course begins directly after commencement day, and continues four weeks of six days per week, ten hours per day. The work of the student and the discipline of the camp is in the hands of competent instructors. This course must be preceded by Courses 1, 2 and 4. Students conditioned on any of these courses may be admitted at discretion of instructor in charge. (At conclusion of second year of course.)

23. **Summer Course in Field Work.** Similar to Course 22. Students work on advanced railroad surveying and topographical surveying. This course must be preceded by Courses 3, 22 and 24. Students conditioned in any of these courses, may be admitted at discretion of instructor. (At conclusion of third year of course.)

24. **Drawing of Engineering Structures.** Five hours a week. (Second Term, third year, Course in Civil Engineering)





1—MEASURING VELOCITY OF CURRENTS

2—MAKING CROSS SECTION OF RIVER-BED

DRAWING

Office, Hayes Hall, Room 22

Associate Professor Bradford, Assistant Professor French, Mr. Lewis, Mr. Martin

The Department occupies the entire third floor and one room in the basement of Hayes Hall, and is provided with the following equipment for the illustration of the work in drawing and for practical training in the same:

For freehand drawing, water color and oil painting: — A large studio thirty-five by eighty feet, specially arranged and provided with adjustable tilting tables and easels, a well selected collection of pencil, pen and ink, charcoal and color specimens of work, wooden models of geometric forms, plaster-casts of ornaments, flowers, fruit and the antique.

For clay-modeling: — A specially arranged and equipped studio twenty-six by thirty-two feet for modeling in clay and casting in plaster, consisting of modeling stands, moisture box, casting table, modeling tools of wood and steel, stove and vent-hood for the preparation of gelatine molds, and lockers.

For mechanical drawing and mechanical and architectural designing: — A large, well lighted room forty by eighty-five feet, provided with O. S. U. drawing tables (30″ by 36″ tops), a set of Schroeder models, a collection of shop drawings and facilities for blue-printing.

For photography: — A well arranged and equipped dark-room, printing apparatus, copying camera, six view cameras, lenses of long and short focus, telephotographic lens, shutters for instantaneous exposures and an excellent outfit for photo-micrography.

In addition to the above, the library contains a well selected collection of books pertaining to the work of the Departments.

1. **Free Hand Drawing.** Practice and occasional lectures. Pencil, charcoal, pen and water-color drawing from copies, models and plaster casts.

One drawing period a week. (First, Second and Third Terms, first year, Short Course in Industrial Arts.)

Two drawing periods a week. (First Term, second year, Short Course in Mining; and Second Term, Short Course in Clay-working.)

Two drawing periods a week. (First and Second Terms, first year of all four-year courses.)

MODELING ROOM

PHOTOGRAPHIC LABORATORY

2. **Lettering.** Practice and occasional lectures.

   Two drawing periods a week. (Third Term, first year, Short Course in Industrial Arts; and second year, Short Course in Mining.)

   Three drawing periods a week. (Third Term, first year, all four-year courses.)

   This course must be preceded by Course I.

3. **Mechanical Drawing.** Lectures or recitations. One period a week. Practice two periods a week. Subjects: Orthographic, Isometric and Oblique Projection and elementary Working Drawings. (First Term, second year, all four-year courses, except Chemistry; and Short Courses in Mining and Industrial Arts.)

   Lectures or recitations two periods a week. Practice one period a week Short Course in Iudstrial Arts and in all four-year courses, except Architecture, Chemistry and Civil Engineering; three periods a week in Architecture and Civil Engineering. Subject: Descriptive Geometry. (Second Term, second year.)

   Lectures or recitations, one period a week. Practice, two periods a week in Short Course in Industrial Arts and in all four-year courses, except Architecture and Chemistry; four periods a week in Course in Architecture. Subject: Shades, Shadows and Perspective. (Third Term, second year.)

   This course must be preceded by Course 2.

4. **Draughting and Blue-printing.** Practice and occasional lectures. Three periods a week. (Second Term, second year, Short Course in Mining.)

   This course must be preceded by the first term of Course 3.

5. **Technical Drawing.** Lectures and practice. Rules and methods for making working drawings in machine design, to correctly represent form and dimensions for shop use, and for tracing and blueprinting the same. Three periods a week. (First Term, third year, Courses in Mechanical and Electrical Engineering, Industrial Arts and Manual Training.) This course must be preceded by Courses 2 and 3.

7. **Photography.** Lectures and practice. Lectures: Optics of Photography, Chemistry of Photography, Exposing and Developing, Printing, Lantern Slides, Orthrochromatic Photography and some of the applications of Photography. Practice in outdoor, interior, instantaneous and flashlight photography, copying, lantern slides and printing. Two periods a week. (First Term, third year, Course in Architecture; Third Term, third year, Courses in Civil and Mechanical Engineering; Third Term, fourth year, Courses in Ceramics and Mining Engineering.)

8. **Mechanical Drawing.** Lectures and practice. Geometric and Projection Drawing. Two periods a week. (First and Second Terms, first year, Short Course in Industrial Arts.)

11. **Mechanical Drawing.** Lectures and practice. Five periods a week. (Third Term, second year, Short Course in Clay-working.)

12. **Clay Modeling.** Modeling in clay and casting in plaster, ornamental forms from designs, photographs, nature and original designs. Two periods a week. (Second and Third Terms, third year, Course in Architecture; and second year, Course in Manual Training.)

This course must be preceded by Course 1.

12. **Pen Drawing.** Two periods a week. (First Term, second year, Course in Architecture.)

This course must be preceded by Course 1.

18. **Water Color Painting.** Three periods a week. (Second Term, fourth year, Course in Architecture.)

19. **Water Color Painting.** Two periods a week. (Third Term, fourth year, Course in Architecture.)

ECONOMICS AND SOCIOLOGY

Office, University Hall, Room 18

Associate Professor Clark

Course 51 must precede all other courses.

51. **Elements of Political Economy.** Text-book, lectures and individual investigations. A careful study of the laws of production, exchange, distribution and consumption of wealth; combined with an analysis of the industrial actions of men as regards land, labor, capital, money, credit, rent, interest, wages, etc. Four times a week. (First Term and first half Second Term, second year, Course in Industrial Arts.)

55. **Practical Problems in Economics.** Lectures and collateral readings. A rapid study of immigration, money, railroads, crises and tariff. Twice a week. (Alternative with Economics 57. First Term and first half Second Term, third year, Course in Industrial Arts.)

56. **Industrial and Social Reforms.** Lectures and collateral readings. A study of labor problems, charities and corrections, monopolies, insurance, trusts, etc. Twice a week. (Second half Second Term and Third Term, second year, Course in Industrial Arts.)

57. **The Transportation Problem.** Lectures. A study of the development and present economic status of roads, canals and railroads in their relation to industry and to the state. Twice a week; every other year. (Alternative with Economics 55. First Term and first half Second Term, third year, Course in Industrial Arts.)

58. **Money, Credit and Banking.** Texts, lectures and collateral reading. This course involves the history and theory of the subject; a comparative study of monetary systems, currency, etc.; together with various methods of banking; national banks, clearing houses, sub-treasury, etc.; and a critical analysis of proposals for reform. Twice a week. (Alternative with Economics 66. Second half Second Term and Third Term, third year, Course in Industrial Arts.)

65. **Commercial Geography.** Texts and lectures. A scientific study of business relations and conditions, domestic and foreign; the sources, quantity and quality of products, and the distribution of the same; trade routes and the means of communication. The Consular Reports will constitute one basis of study. Twice a week. (First Term and first half Second Term, third year, Course in Industrial Arts.)

66. **Commerce and Trade.** Lectures. Theory and practice of business. Standard business forms, commercial paper, stocks and bonds, insurance policies and investment securities of all kinds will be studied with the aid of sample copies. This is an advanced course and should be preceded by four elective courses in the department including Course 60. Required readings and reports on current commercial and financial literature. Twice a week. (Alternative with Economics 58. Second half Second Term, and Third Term, third year, Course in Industrial Arts.)

EDUCATION

Office, University Hall, Room 54

Professor Gordy, Mr. Hamilton

51. **Elementary Educational Psychology.** This course is intended to be helpful to three classes of students: (1) Those who are not preparing to teach, but who wish to make some study of education in order that they may perform their duties as members of society more intelligently; (2) Those intending to teach and who wish to study the relations between Psychology and education;

and (3) Those preparing to be superintendents and who wish to get suggestions as to the best method of teaching Psychology to teachers. The text used is Gordy's *Psychology.* Students will be required to do collateral reading and bring in reports of their work. Four hours a week. (First Term and first half Second Term, third year, Course in Manual Training.)

52. **Modern Educational Theories.** These theories will be studied from three points of view: (1) As the expression of a certain philosophy of life; (2) from the point of view of their consistency; and (3) from that of their truth. The work is based on Quick's *Educational Reformers.* Four hours a week. (Second half Second Term and Third Term, fourth year, Course in Manual Training.)

58. **The Philosophy of Education.** This course aims to make a systematic exposition of the philosophy of education. Four hours a week. (Second half Second Term and Third Term, fourth year, Course in Manual Training.)

59. **Child Study.** An elementary course in the growth and development of children, giving especial attention to the pedagogical aspect of the subject. Though arranged primarily for teachers this course treats of subjects of universal interest such as the child as a social factor, function of play, the child and self-government, the child and the race, etc. Twice a week. (First Term and first half Second Term, fourth year, Course in Manual Training.)

67. **Educational Values.** This course seeks to determine the capacity of the various subjects pursued in elementary and secondary courses to contribute to true educational ideas. The work is based on Fouillie's *Education from a National Standpoint.* Twice a week. (First Term and first half Second Term, fourth year, Course in Manual Training.)

ELECTRICAL ENGINEERING

Office, Electrical Building, Room 8

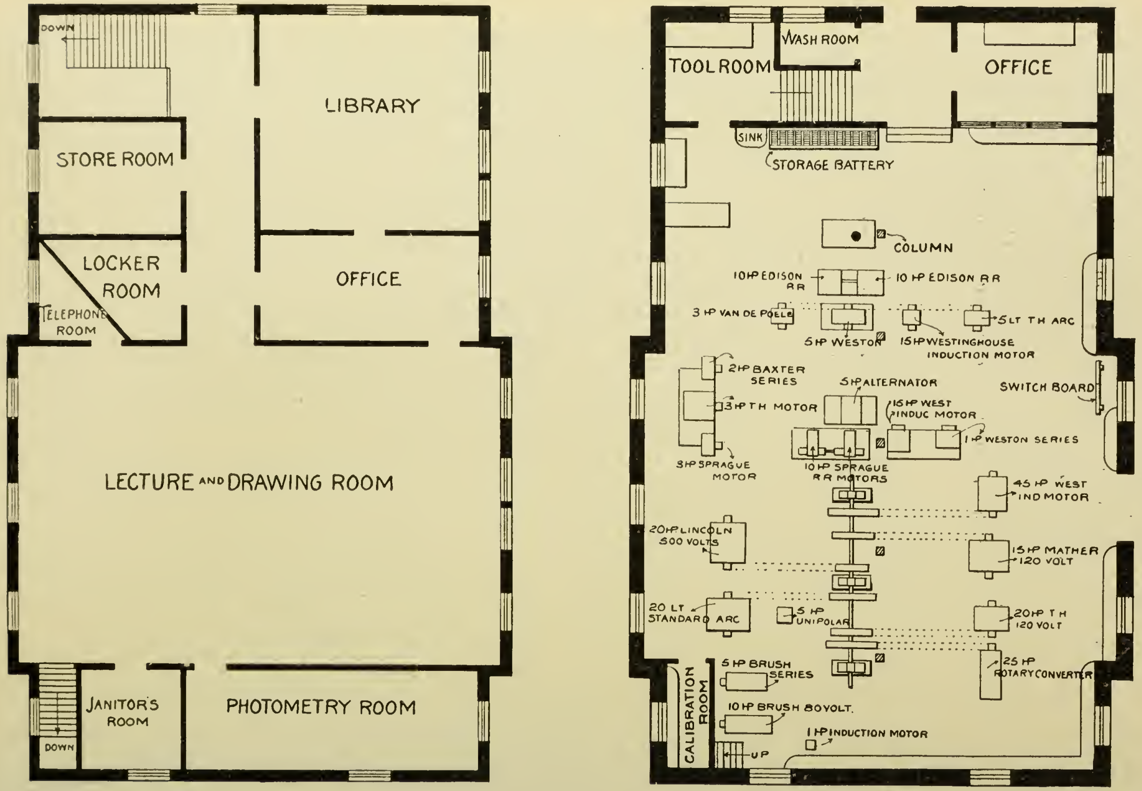
Associate Professor Caldwell, Mr. Fish

This Department has excellent facilities for practical experimental work with dynamo machinery and other electrical apparatus. The elementary electrical testing is provided for in the Physical Department, which permits this Department to devote its energies to the study of engineering apparatus proper. The dynamo equipment consists of twenty-five machines of various makes and sizes from 40-H. P. down; aggregating over 240 horse-power. These include 110 and 500 volt direct and alternating current generators, polyphase motors, arc and incandescent lighting generators, railway and stationary motors, a rotary converter specially designed for experimental work, and a unipolar dynamo. The two latter, with an alterating current generator and a 2-phase motor, were built by the students, it being the policy of the Department to build much of its apparatus. There are also a number of transformers of different makes, including one for welding and one of special design for testing, both built at the University. Arc lamps of different styles, a 10 kilowatt-hour storage battery, condensers and resistances, and magnetic testing apparatus also form part of the equipment. The list of measuring instruments is quite complete, and includes a standard Weston voltmeter and eleven other Weston volt and ammeters, also four Kelvin static voltmeters, five dynamometers, two wattmeters, galvanometers and 14 other ammeters and voltmeters of different makes. There is a telephone laboratory — with apparatus for comparative tests, a variety of transmitters and receivers, lines running to another building, and material illustrative of switch-board practice. Photometry is given at present in the Physical Laboratory, where the equipment in this line is excellent. A large 200,000 volt transformer is being built by some of the students of the Department.

Power for running the dynamo laboratory is supplied by three induction motors from the University Power Plant. There is also a small but well selected and growing collection of photographs, blue-prints, and material illustrative of Electrical Manufacture. The library of the Department is kept in the building and is especially valuable on account of the completeness of its sets of periodicals and transactions.

The University Power Plant (see page 96) is of great value as illustrative of a model installation. This plant has been mostly installed by students who receive pay for such work.

The Department has its own machine shop and a machinist who gives half his time to construction and repair work.



SECOND FLOOR PLAN

FIRST FLOOR PLAN

ELECTRICAL LABORATORY.

Columbus and neighboring towns have many electrical plants of different systems which welcome visiting students. It is also usual to make an inspection trip to one or more of the cities of the State to visit manufacturing establishments and other points of electrical interest.

The Electrical Hall was built in 1889 by a special appropriation of the Legislature, and is occupied entirely by the Department of Electrical Engineering. In is a twostory brick building about seventyfive by fortyfive feet. In the first floor, sixty feet are taken up by the dynamo room, which is well lighted and has an asphalt floor, laid on concrete. The remainder of the floor is occupied with an office and apparatus room, a shop, a dark room for photography and a calibrating room arranged for the accurate and easy standardization of the instruments used in the laboratory. On the second floor are a lecture and draughting room 45 by 30 feet, a reading room and library, office, photometric laboratory, stock room, locker room and janitor's room. The building and its equipments are valued at about fifteen thousand dollars.

6. **Electrical Engineering.** Lectures on direct and alternating circuits, dynamo machinery, transformers, accumulators and applications. Twice a week. (First and Second Terms, third year, Course in Architecture; and fourth year, Courses in Industrial Arts and Manual Training.)

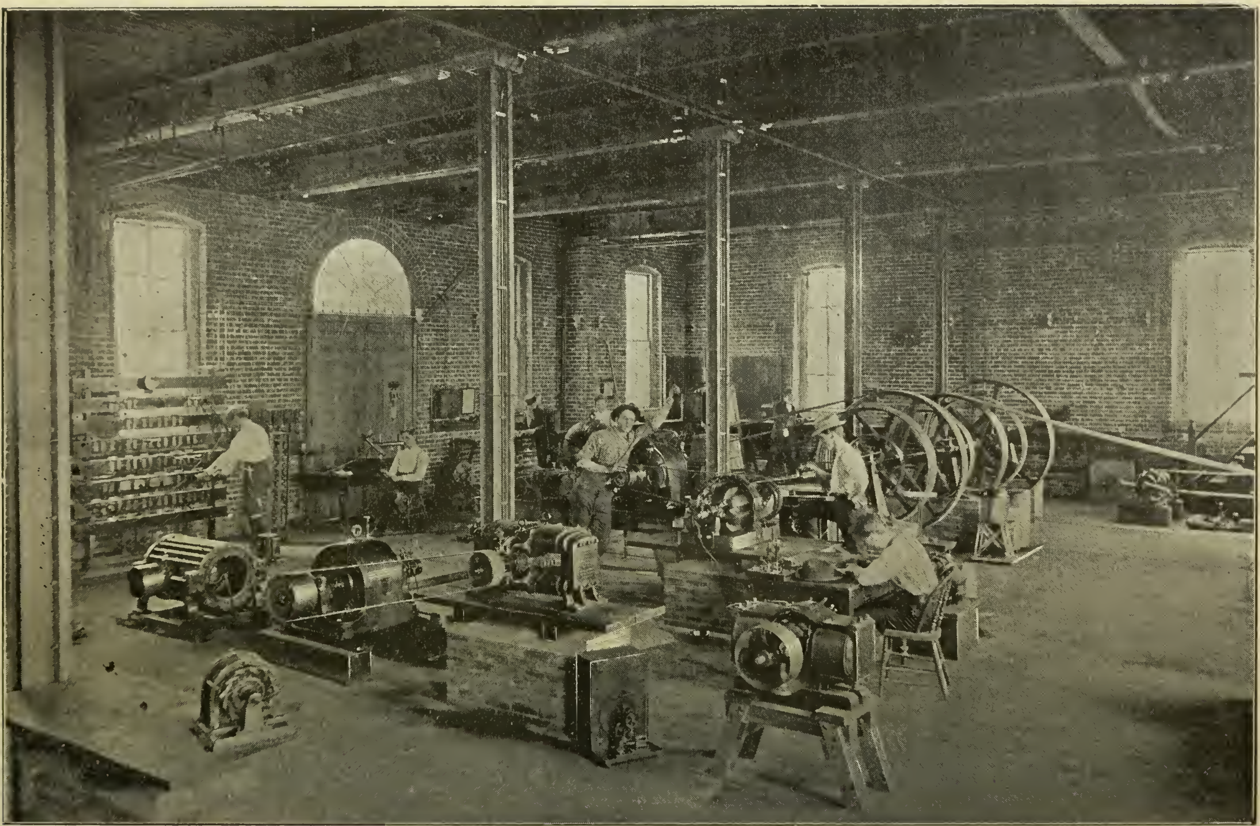
7. **Electrical Engineering.** Laboratory work on the subjects treated in Course 6, which it accompanies. Twice a week. (First and Second Terms, fourth year, Courses in Industrial Arts, Manual Training, Mining and Mechanical Engineering; Second Term, third year, Course in Architecture; fourth year, Civil Engineering.

8. **Direct Current Dynamo Machinery.** Generators and Motors, their theory, construction and operation. Lectures, recitations and problems. Four times a week. (Second Term, third year, Course in Electrical Engineering.)

9. **Elementary Dynamo Laboratory.** Handling and testing of circuits, generators, motors, accumulators, lamps, etc. Nine actual hours per week. (Third Term, third year, Course in Electrical Engineering.)

10. **Alternating Current Circuits and Machinery.** Generators, transformers, single and polyphase motors, apparatus and systems. Lectures, recitations and problems. Three times per week. (First and Second Terms, fourth year, Course in Electrical Engineering.)

11. **Advanced Dynamo Laboratory.** Continuation of the work begun in Course 12, together with alternate current apparatus, telephone apparatus, etc. (First and Second Terms, six actual hours. Third Term, with thesis work nine actual hours. Fourth year, Course in Electrical Engineering.)



ELECTRICAL LABORATORY

12. **Electrical Transmission and Distribution.** Systems, operation and apparatus. Twice a week. (Second Term, fourth year, Course in Electrical Engineering.)

13. **Application of Electricity.** Brief treatment of the elements of Illumination, Street Railway Work, Telephone, Telegraph, Electro-metallurgy, Mining, etc. The seminary method is used in this course to the extent of each student writing one paper on some assigned subject, and reading the same before the class. Five times per week. (Third Term, fourth year, Course in Electrical Engineering.)

14. **Electrical Design.** Includes wiring of buildings, Direct and Alternate current generators, transformers, distribution, etc. Eight hours per week in the drawing room. (Second and Third Terms, fourth year, Course in Electrical Engineering.)

FRENCH

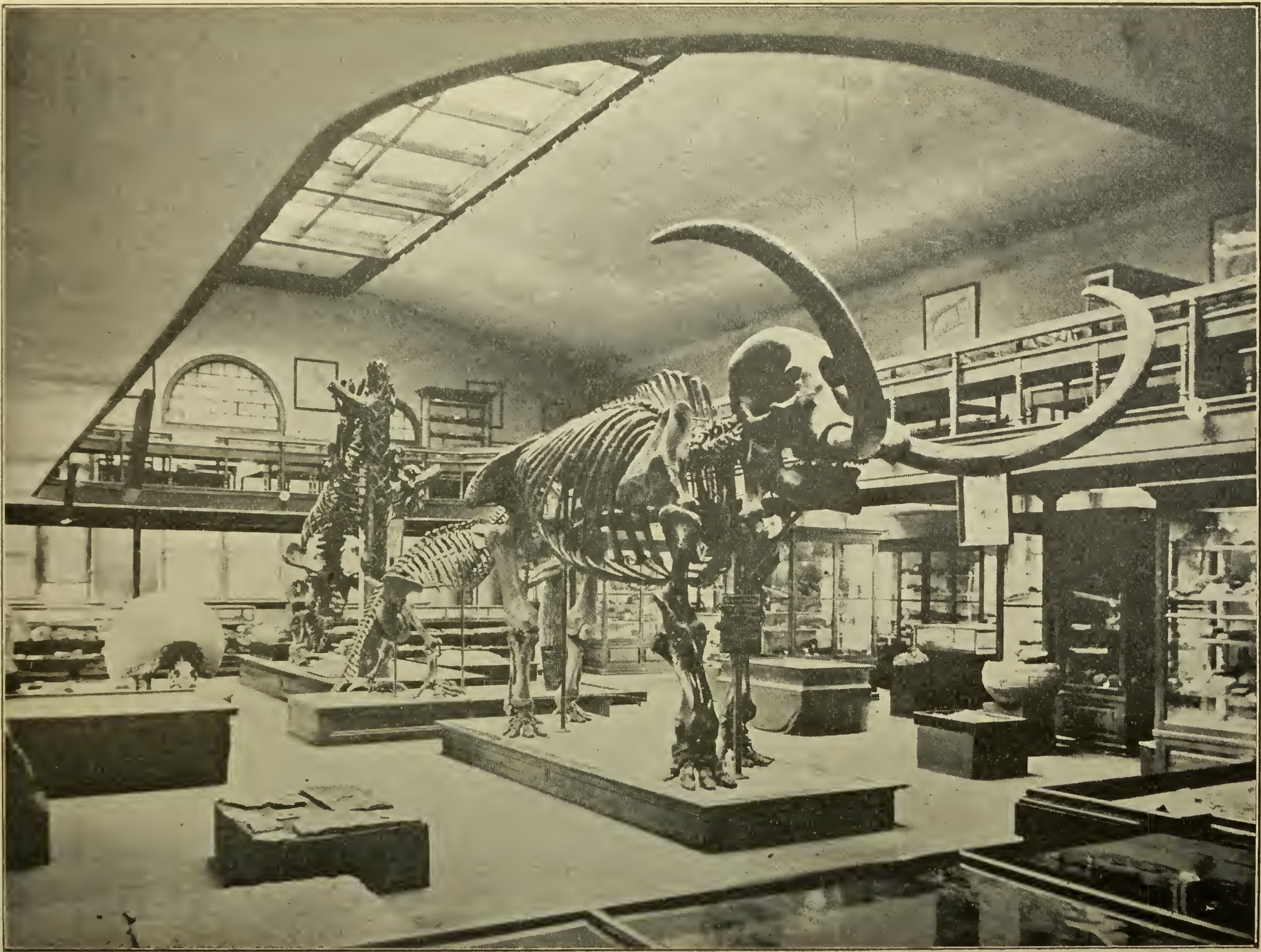
(DEPARTMENT OF ROMANCE LANGUAGES AND LITERATURES.)

Office, University Hall, Room 35.

Professor Bowen, Assistant Professor Bruce, Mr. Dowd.

1. **Elementary French.** Grammar and reader, modern prose and plays. Four times a week. Required of all students who offer partial credit in French as their entrance language, except those who elect courses in Ceramics or Chemistry. Offered as alternative with German 1 to those who enter with full or partial credit in Latin, or without previous language training, except to those who elect courses in Ceramics or Chemistry.

2. **Modern French Literature.** Four times a week. Open to those who have completed Course 1, or its equivalent. Required of all students who offer French as their entrance language, except those who elect courses in Ceramics and Chemistry.



GEOLOGICAL MUSEUM

GEOLOGY

Office, Orton Hall, Room 1.

Associate Professors Prosser and Bownocker.

The University is able to present unusual advantages for the study of Geology. By an act of the Legislature it has been put in possession of all the collections made by the late geological survey, and these collections have been supplemented by valuable additions of fossils and minerals from various sources. The State collection embraces a very complete representation of every geological formation shown in Ohio. In its new and ample quarters the Department offers exceptionally good opportunities for work in the lithological and strategraphical laboratories.

Orton Hall, completed at a cost of more than $100,000, is designed for the permanent accommodation of the large geological collection of the University and for work and instruction in the Department of Geology. A portion of it is occupied by the library and reading room. The building is two stories in height, with a high basement, is built of brick and faced with sandstone, and is fire-proof throughout. Some of the material was contributed by various quarries of the State of Ohio, and almost all of the finer varieties of Ohio building stone are represented in the columns, walls and ceiling panels of the vestibule. At the right of the main entrance is the geological lecture room and professor's private room; at the left is the University library, reading room and librarian's private room. The central and rear portion is occupied by the geological and paleontological museums, while the museum of economic geology is in the basement. The laboratories of lithological and strategraphical geology are on the second floor.

1. **Physiography.** Recitations, lectures, map work. The probable origin of the earth and its relations to other heavenly bodies. The features of the earth's surface and the agencies producing these. The atmosphere, climate, etc. Oceans, rivers and lakes. Five hours. Third Term, first year, Short Courses in Mining, Clay-working; and second year, Short Course in Industrial Arts.

4. **Elementary Geology.** Recitations, lectures, laboratory work. Lithological, dynamical, structural and historical geology. Five hours. (Second Term, second year, Short Course in Mining.)

5. **General Geology.** Structural, historical and dynamical geology. Three hours lectures and recitations and four hours laboratory and field work. In the laboratory Dana's Manual of Geology, the Ohio Geological Reports and characteristic fossils will be studied. In the field specimens will be collected, sections measured, formations identified and the student given an idea of the methods of work pursued by a field geologist. Credit five hours. (First Term, fourth

year, Courses in Architecture. Ceramics, Civil and Mining Engineering; and second year, Short Course in Clay-working.)

6. **Economic Geology.** Lectures and assigned reading. Economic materials of stratified rocks, — clays, limes, cements, coals, iron ores, phosphates, petroleum and gas. Economic materials derived from unstratified rocks — gold, silver, copper, mercury, etc. Three hours. (Second Term, fourth year, Courses in Architecture, Ceramics, Civil and Mining Engineering: and second year, Short Course in Clay-working.)

7. **Petrography.** Lectures and laboratory work. The igneous, sedimentary, and metamorphic rocks, — their origin and classification. The volcanic rocks of the western United States, — their composition, structure and alteration products. The object of this course is to give the student a practical acquaintance with rocks. Two hours. (Second Term, fourth year, Course in Mining Engineering.)

GERMAN

(DEPARTMENT OF GERMANIC LANGUAGES AND LITERATURES)

Office, University Hall, Room 30.

Professor Eggers, Associate Professor Mesloh, Mr. Moore.

1. **Elementary.** Four times a week. Required of all students who offer partial credit in German as their entrance language. Offered as alternative with French 1 to all students who enter with full or partial credit in Latin, or without previous language training, except those who elect Ceramics or Chemistry.

5. **Science Reading.** Four times a week. Open to those who have completed Course 1 or its equivalent. Required of all students who offer German as their entrance language.

HISTORY

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE.)

Office, University Hall, Room 15.

Professor Knight, Dr. J. B. Sanborn.

56. **Political History of the United States.** Lectures, text-books and prescribed reading. Hart's *Formation of the Union;* Wilson's *Division and Re-Union.* Two sections. Four times a week. (Last half Second Term and Third Term, third year, Courses in Industrial Arts and Manual Training.)

INDUSTRIAL ARTS

Office, Hayes Hall, Room 2.

Professor Sanborn, Mr. Knight, Mr. Renck, Mr. Crowe, Mr. McIntire

The shops, which occupy the north wing of Hayes Hall, afford excellent facilities for instruction in both the practical details and the underlying principles of carpentry, pattern-making, forging, moulding, foundry work and machine work.

The carpenter and pattern shop is equipped with twenty-five benches with complete sets of carpenter tools for each and a large number of special tools for general use, twenty-three pattern-makers' turning lathes, with cupboards containing the necessary turning and pattern-making tools under each, an 8 foot pattern-maker's lathe with compound rest, a pony planer, a buzz planer, a circular rip and crosscut saw, a scroll saw, a trimmer and a power grindstone.

The forge shop is equipped with twenty stationary forges, with anvils and tools for each, a heating forge, a portable hand forge, a foot-power hammer, a blacksmith's drill and a punch, shear and bar cutter. The blast for the forges is furnished through under-ground piping by a 45″ Buffalo pressure blower, and the smoke is removed by a 55″ Buffalo exhaust fan overhead. Both of these fans are driven by a 15 horse-power electric motor.

The foundry is equipped with a 24″ Calliau cupola, the blast for which is furnished by a 30″ Buffalo blower; two brass furnaces, one 16 inches in diameter and the other 20 inches in diameter; a core oven, benches for iron and brass moulding, core-making and cleaning of castings, a space for floor moulding 30 feet by 40 feet, besides all the necessary moulding tools, flasks, crucibles, ladles, tongs, etc.

The machine shop is driven by a 30 horse-power electric motor from above, and is equipped with the following tools: Twenty-eight benches for vise work, with complete sets of tools; eight speed lathes, sixteen engine lathes, a Fox monitor turret lathe, two planers, two shapers, a milling machine, an upright drill, a sensitive drill, grinding machines for both plane and cylindrical surfaces, tool grinders, emery wheels, etc. This machinery is furnished with all the necessary tools, and the tool-room is equipped with full sets of drills, taps, dies, milling cutters, standard plugs, guages, threads, micrometers and a great variety of special tools.

Hayes Hall is a large building of pressed brick and brown sandstone, completed and equipped at a cost of about $70,000. It is devoted to instruction in Industrial Arts, Drawing, Civil Engineering, Mechanical Engineering and Domestic Science. The central portion is three stories high and the front wings are two stories each. On the

INDUSTRIAL DEPARTMENT—MACHINE SHOP

first floor are two offices, the rooms of the Department of Domestic Science and two lecture rooms; besides the machine shop, the forge shop and the foundry. On the second floor are the carpenter and pattern shops, and the Department of Civil Engineering, with private rooms annexed. The Department of Drawing occupies the third floor for instruction in mechanical and free-hand drawing and photography.

1. **Tools and Machines.** Lectures and recitations on hand and machine tools and the principles underlying their construction and operation, and materials used in construction. Three times a week. (First, Second and Third Terms, third year, Courses in Industrial Arts and Manual Training; and second year, Short Course in Industrial Arts.)

2. **Designing.** Problems in design, to accompany Course 1. Three times a week. (Second and Third Terms, third year, Courses in Industrial Arts and Manual Training.)

3. **Shop Equipment, Appliances and Management.** A continuation of Course 1. Lectures and recitations on the strength and durability of the materials used in construction: shop and factory buildings and their construction; power, power transmission and prime movers: automatic machines and other special devices for turning out cheap and accurate work: methods of compensation and shop accounts and management. Three times a week. (First, Second and Third Terms, fourth year, Course in Industrial Arts.)

4. **Advanced Designing.** Problems in the design of buildings and the arrangement of machinery, line-shafting, etc., for manufacturing plants; to accompany Course 3. Three drawing periods a week. (First, Second and Third Terms, fourth year, Course in Industrial Arts.)

5. **Workshop Appliances.** Lectures and problems on the construction of shop buildings and the arrangement of machinery; power required and the means of transmission: friction in line-shafting and the efficiency of machinery; automatic machines and special shop appliances. Three times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

7. **Machine Design.** Practical application of the principles of machine design. Three periods a week. (Third Term, third year, Course in Electrical Engineering.)

MATHEMATICS

Office, University Hall, Room 45

Professor Bohannan, Associate Professor McCoard, Assistant Professor Arnold, Assistant Professor Swartzel, Mr. Young, Miss Ball

1. **Elementary Algebra.** Venable. Five times a week. (First Term, first year, Short Course in Clay-working.)

2. **Elementary Algebra.** Wentworth. Five times a week. (First, Second and Third Terms, first year, Short Courses in Mining and Industrial Arts.)

3. **Plane Geometry.** Venable. Five times a week. (First Term, first year, Short Courses in Mining and Industrial Arts.)

3a. **Plane Geometry.** Venable. Five times a week. (Second Term, first year, Short Course in Clay-working.)

13. **Solid Geometry.** Venable. Five times a week. (Second Term, first year, Short Courses in Mining and Industrial Arts.)

14. **Plane Trigonometry.** Loney. Five times a week. (First Term, first year, all four-year Courses; Third Term, first year, Short Courses in Mining and Industrial Arts.)

15. **Analytical and Spherical Trigonometry.** Loney, with notes on Spherical Trigonometry. Twice a week. (Second Term, first year, all four-year courses.)

16. **College Algebra.** Taylor. Three times a week. (Second Term, first year, all four-year courses.)

17. **Plane Analytics.** Loney. Five times a week. (Third Term, first year, all four-year courses.)

18. **Analytics and Differential Calculus.** Loney. Venable. Edwards. Five times a week. (First Term, second year, Courses in Architecture, Ceramics, and Civil, Electrical, Mechanical and Mining Engineering.)

19. **Differential Calculus.** Edwards. Five times a week. (Second Term, second year, same as 18.)

20. **Integral Calculus.** Edwards. Five times a week. (Third Term, second year, same as 18.)

11. **Differential Equations.** Edwards. Once a week. (First Term, third year, Course in Mechanical Engineering.)

MECHANICAL ENGINEERING

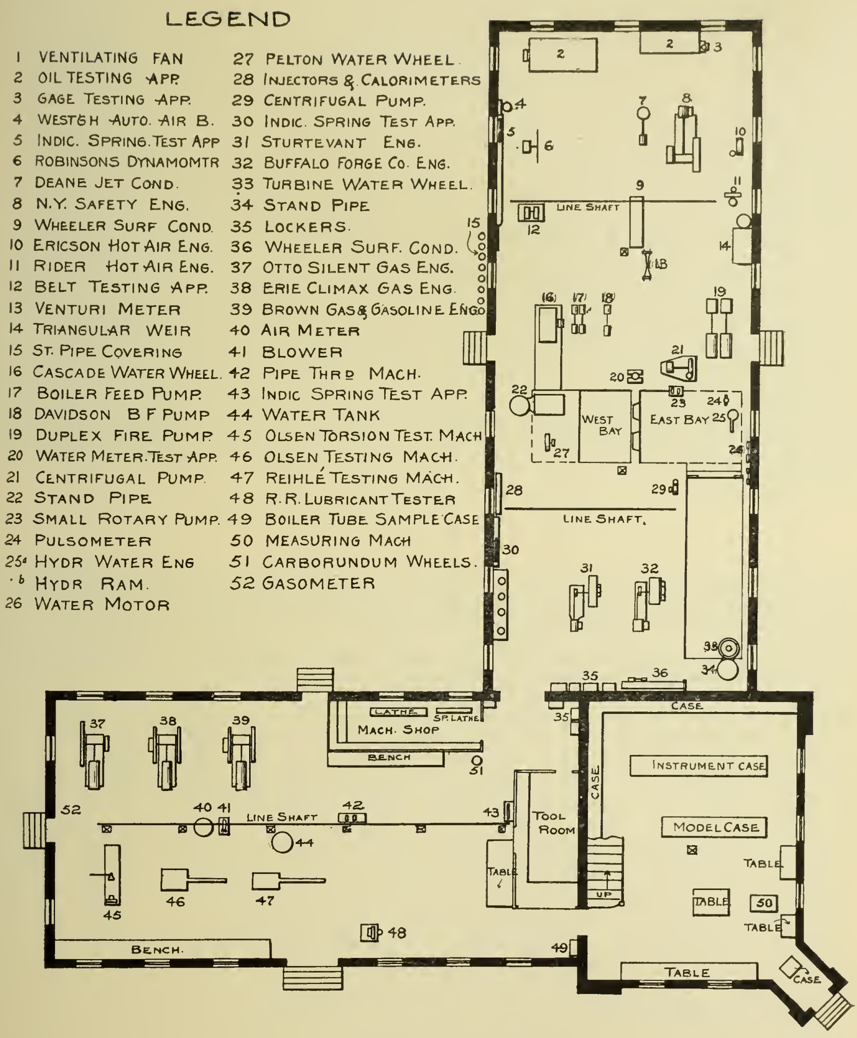
Office, Hayes Hall, Room 11

Professor Magruder, Associate Professor Hitchcock, Mr. Hale, Mr. Grate

The lectures and recitations of this Department are held in rooms Nos. 11 and 12 of Hayes Hall, and in the room on the second floor of the Mechanical Hall. Mechanical Hall is a brick building, 93 feet front by 32 feet deep, with a wing 32 by 80 feet. The second floor contains a lecture room, and is fitted with drawing tables. The main floor has three large rooms. The Museum is fitted with glass cases for the care of delicate apparatus, measuring machines and other instruments of precision, samples of engineering supplies and specimens of materials which have been tested and broken either in the laboratory or in practice; and also a collection of models of mechanism and valve gears.

The south laboratory is used for applied mechanics and for gas engineering. Here are located the machines for testing the strength and elasticity of engineering materials, and recording their physical properties automatically and autographically. Oils are tested as illuminants and as lubricants. Belts and pulleys are tested for their slippage, friction and horse-power transmitted. The gas engine plant has four engines using gas, gasoline or oil, three methods of ignition, and fly ball and inertia governors. The air may be supplied by a fan through a large meter. Temperatures and pressures of air, gas, oil and water are measured. The fresh and burnt gases are analyzed and their heating values determined by a calorimeter. The power is measured with both the indicator and the brake. The laboratory machine shop and the tool room are in this room.

The north laboratory is used as a steam engineering and hydraulic laboratory. Four 35-horse power engines give facilities for testing single or twin, condensing or non-condensing, simple or compound, throttling or automatic cut-off engines, using either a jet or a surface condenser. Pressure and vacuum gauges are calibrated. Indicator springs of five makers are tested both cold and hot. Five kinds of calorimeters determine the moisture in steam before and after passing three different separators. Injectors are tested for lift, quantity, pressure and steam consumption. Simple and compound steam pumps of six makes, ranging to 1200 gallons per minute capacity; two centrifugal, a triplex power pump and a rotary pump, enable tests of pumps to be made and deliver water at pressures below 150 pounds to two stand-pipes, which in turn supply turbine, Cascade, Pelton and American Impulse water wheels, and also enable experiments to be made on the flow of water through orifices, pipes, valves, etc. Three cisterns, provided with a variety of



GROUND PLAN
OF
EXPERIMENTAL ENGINEERING LABORATORY

weirs up to five feet wide, give practice in measuring flowing water. A Venturi meter and a Pitot tube are also used. Ericsson and Rider hot air engines are tested. A Rife hydraulic engine, a Humphryes ram, Gem and Eureka water motors, and a pulsometer, are included in the hydraulic apparatus, all of which are connected and prepared for complete tests.

A complete set of Westinghouse air-brake apparatus, a blower and a ventilating fan, enable experiments to be performed in the flow of air, which are supplemented by tests of the heating and ventilating plants in the buildings of the campus.

In addition to the apparatus and equipment of the power plant of the University (for description see page 96), the power house at Townshend Hall contains a horizontal, return tubular boiler, two steam engines and a 6-ton ammonia compression refrigerating machine fitted up with thermometers and an ammonia meter and prepared for making complete tests, thereby making the facilities on the campus for engineering testing quite complete. Machinery, apparatus and appliances are continually being presented, built or purchased, and the student is given an opportunity to test everything under practical conditions of operation. Besides the laboratory facilities, opportunities frequently arise to test machinery, engines or boilers in the city, and in these tests the students take part.

3. **Mechanism.** Lectures and recitations on the principles of mechanism and mechanical movements. Five times a week. (Second Term, third year, Mechanical and Electrical Engineering Courses.)

   The accurate laying out of movements, embodying the principles of mechanism. Twice a week. (Third Term, third year, Course in Mechanical Engineering.)

6. **Analytical Mechanics.** Five times a week. (First and Second Terms, third year, Courses in Architecture, Ceramics, and Civil, Electrical, Mechanical and Mining Engineering.)

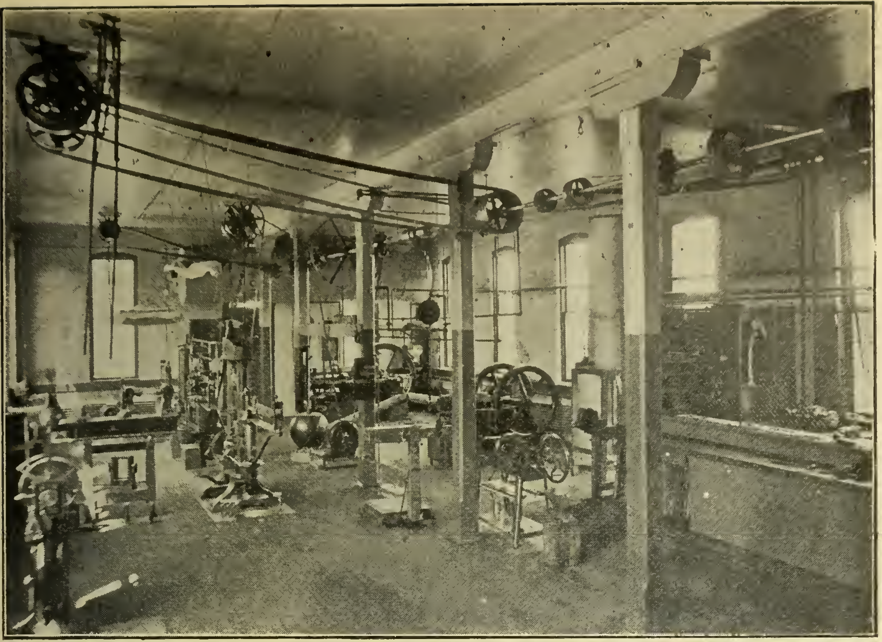
7. **Strength of Materials.** Recitations and lectures on the elastic and ultimate resistance of the materials of engineering to stress and their use in structures and machines. Lectures on elementary hydraulics and the flow of water through orifices and pipes over weirs, and in streams, and on measuring the same. Five times a week. (Third Term, third year, same as 6.)

12. **Experimental Engineering Laboratory**. Twice a week. (First Term, third year, Course in Mechanical Engineering.)

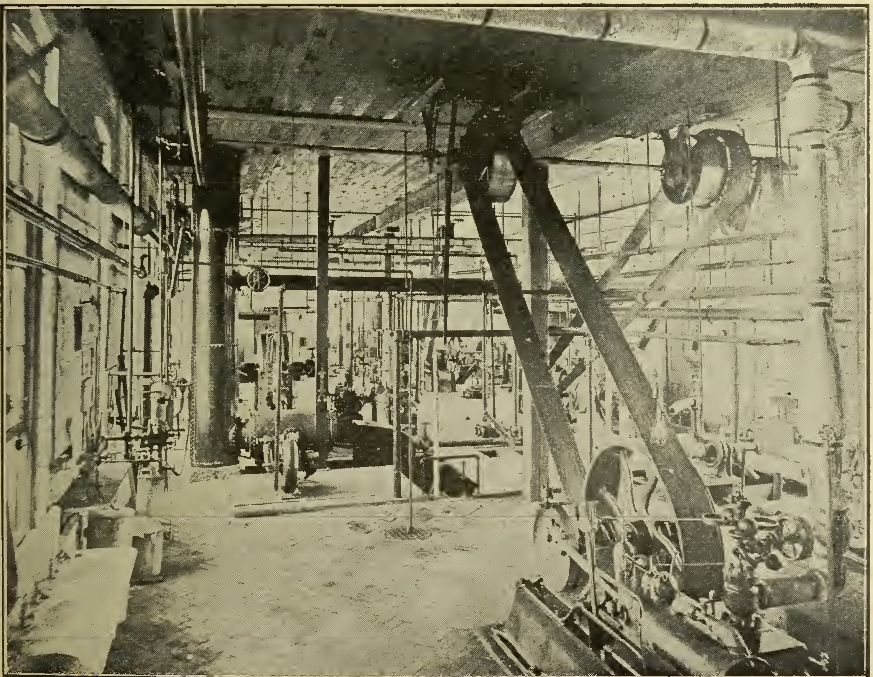
14. The same. Four times a week. (Second Term, fourth year, Course in Mechanical Engineering.)

15. The same. Three times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

17. The same. Three times a week. (Second Term, fourth year, Course in Civil Engineering.)



EXPERIMENTAL ENGINEERING LABORATORY
GAS ENGINES AND TESTING APPARATUS



EXPERIMENTAL ENGINEERING LABORATORY
STEAM ENGINES AND HYDRAULIC MACHINES

Courses 12, 14, 15, 17, 24, 25 and 27, in the Experimental Engineering Laboratory, are arranged to meet the needs of the different students in obtaining experimental practice in the use and calibration of accurate measuring instruments; in testing illuminating and lubricating oils for friction, endurance, and the like; in the calibration and adjustment of gauges and springs; in testing the strength and elasticity of the materials of construction in tension, compression, torsion, flexure, shear and impact, in the flow of liquids and gases; in the use of the steam engine indicator and transmission and absorption dynamometers; in testing of steam separators, injectors, steam pipe coverings; belt, rope and chain gearing; in setting valves and eccentrics; in making efficiency tests of simple and compound, condensing and non-condensing steam engines; of steam boilers and complete power plants; of gas and hot air furnaces; of pulsometer steam and centrifugal pumps; of hydraulic rams and of impulse and turbine water wheels.

18. **Machine Design** Recitations on Unwin's Machine Design, with lectures on American Practice. Five times a week. (First and Second Terms, fourth year, Course in Mechanical Engineering.)

19. **Machine Design.** Practical applications of the principles of machine design. Five drawing periods a week. (Third Term, fourth year, Course in Mechanical Engineering.)

21. **Thesis Work.** Five times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

22. **Timber and Masonry.** Lectures on the construction of foundations and structures in timber and masonry. Five times a week. (The last three-fifths of Second Term, third year, Courses in Mechanical Engineering and Industrial Arts.)

23. **Materials of Construction.** Lectures on the materials used in architecture and building construction, and laboratory exercises on their properties. Four times a week. (First Term, fourth year, Course in Architecture.)

24. **Experimental Engineering Laboratory.** Three times a week. (First and Second Terms. Elective to third and fourth year engineers.)

35. The same. Five times a week. (Third Term, fourth year, Courses in Civil and Mining Engineering.)

27. The same. Five times a week. (First Term, fourth year, Course in Mechanical Engineering.)

28. The same. Twice a week. (Third Term, third year, Course in Electrical Engineering; First Term, fourth year, Course in Industrial Arts; and Third Term, Course in Manual Training.)

29. The same. Three times a week. (First Term, fourth year, Course in Electrical Engineering.) Twice a week. (Second Term, fourth year, Course in Industrial Arts.)

30. The same. Twice a week. (Second Term, fourth year, Course in Electrical Engineering; Third Term, fourth year, Course in Industrial Arts.)

31. **Hydraulic Machinery.** Recitations and lectures on pumping machinery. Three times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

32. **Mechanical Engineering and Power Plants.** A descriptive study of steam and gas engines, boilers, pumps, injectors and other machinery used in plants generating power. Five times a week. (Third Term, third year, Courses in Mechanical and Electrical Engineering; Third Term, fourth year, Courses in Industrial Arts and Manual Training.)

33. **Steam Engines and Boilers.** A detail study of steam using and steam generating machinery. Five times a week. (First Term, fourth year, Courses in Mechanical and Electrical Engineering.)

34. **Thermodynamics.** Lectures and recitations on the transmutations of heat and mechanical energies in steam, gas and air engines, and in air and ammonia compressors, together with a study of the tests of ideal and actual engines and of their indicator diagrams; the flow of gases through pipes and orifices. Five times a week. (Second Term, fourth year, Course in Mechanical Engineering.)

METALLURGY

(DEPARTMENT OF METALLURGY AND MINERALOGY)

Office, Chemical Hall, Room 5

Professor N. W. Lord, Mr. Somermier

The Department of Metallurgy and Mineralogy occupies the eastern part of Chemical Hall. In the basement are the smelting furnaces, the assay laboratory, a room for rough work, and store rooms for supplies. On the first floor is the lecture room of the professor in charge, a laboratory with desks for sixteen students, a store room, a balance room, a private laboratory and an office.

The metallurgical laboratory has all the appliances for the most modern methods of technical analysis as practiced in iron and steel laboratories, including gas analysis. A large room in the basement is fitted for gold and silver assaying, with improved muffle and melting furnaces, sampling apparatus and assay balances.

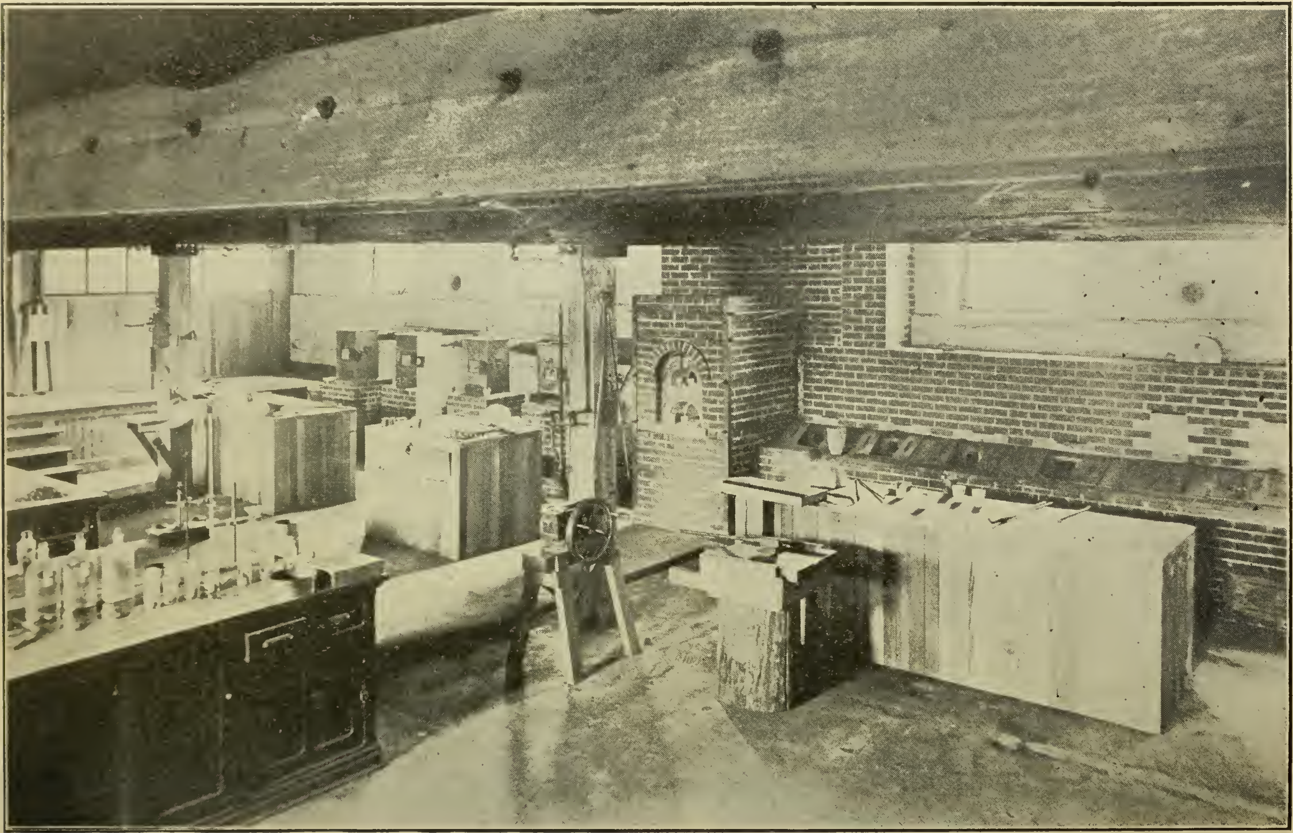
The lecture room in metallurgy has arrangements for projecting photographs of machines, mines, and furnaces, for class illustrations, and there is a large collection of such views. There is a photographic room with blue-printing facilities, where students learn to make copies of the drawings used in illustrating the lectures.

A collection of minerals and rocks with a large set of rock sections is provided for illustrating the mineralogy, as well as sets of blow-pipe apparatus for the students in determinative mineralogy.

2. **Mineralogy.** Lectures arranged so as to be preparatory to Determinative Mineralogy (Course 3). Three times a week. (Third Term, first year, Courses in Architecture, Civil and Mining Engineering; and second year, Course in Chemistry; Third Term, third year, Course in Ceramics.)

3. **Determinative Mineralogy.** Laboratory Course in practical determination of minerals by physical and chemical tests. Each student is furnished with a set of apparatus, and works under an instructor's inspection. Brush's Determinative Mineralogy is used as a manual. Five times a week. (Third Term, third year, Course in Mining Engineering.)

4. **Metallurgy.** A course of lectures upon fuel and its uses, iron and steel, copper, lead, gold and silver, their properties, tests, ores and details of the modes of reduction. The lectures are supplemented by a careful study of references to standard works and journals. Five times a week. (First and Second Terms, third year, Course in Mining; and fourth year, Course in Chemistry.)



ASSAY LABORATORY

(First Term and first half Second Term, third year, Courses in Mechanical Engineering and Industrial Arts.) (First Term, fourth year, Course in Ceramics.)

5. **Metallurgical Laboratory.** Lectures and laboratory work. Laboratory practice in the analysis of iron and steel, fuel and slags, and the assay of lead, copper and zinc ores by wet methods, using approved methods as practiced in technical laboratories of metallurgical works. Course 5 must be preceded by Chemistry 7. Five laboratory periods a week. (First, Second and Third Terms, second year, Course in Mining Engineering; First and Third Terms, third year, Course in Chemistry.)

6. **Assaying.** Laboratory work. Practical work in the assaying of gold, silver and lead ores, by furnace methods. Five laboratory periods a week. (Second Term, third year, Course in Mining Engineering and Chemistry.)

7. **Metallurgical Construction.** Practice in the designing of furnaces and other metallurgical machinery, including detail drawings and estimates. Three times a week. (Second Term, fourth year, Course in Mining Engineering.)

8. **Ore Dressing and Coal Washing.** Lectures. Instruction in the methods of concentrating and enriching ores and fuels by mechanical means. Lectures with reference to standard books and various papers in technical journals. Twice a week. (First Term, fourth year, Course in Mining Engineering.)

9. **Mineral Chemistry.** Lectures upon fire-damp, mine explosions, explosives, boiler waters, poisonous gases, iron ores; iron and steel, their properties and modes of manufacture; coal and coke. Five hours a week. (Third Term, second year, Short Course in Mining.)

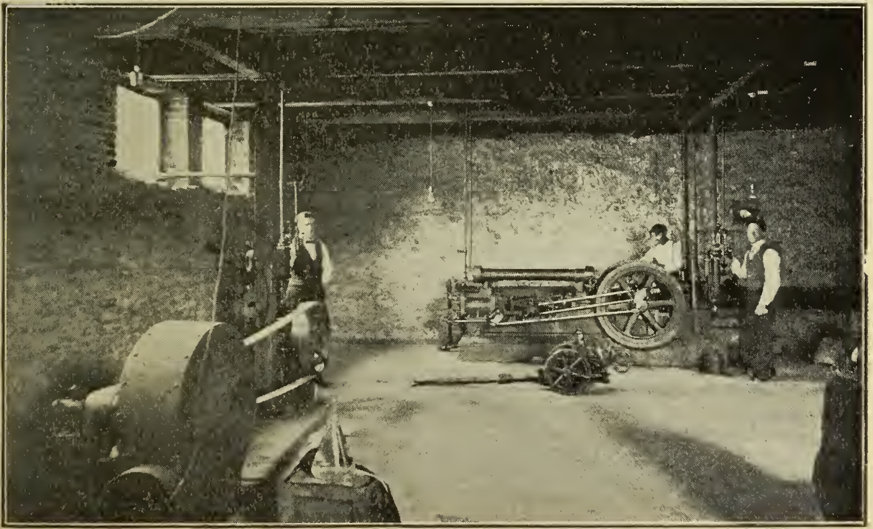
MILITARY SCIENCE AND TACTICS

Office, Armory Room

Major Burns, U. S. A.

1. **Military Drill.** Three times a week through the year.
2. **Tactics.** Lectures and recitations. Twice a week. (Second Term.)
3. **Art of War.** Lectures and recitations. Twice a week. (Second Term.)

LABORATORY FOR METALLURGICAL CHEMISTRY



MINING ENGINEERING LABORATORY—FANS AND COMPRESSOR

MINE ENGINEERING

Office, Chemical Hall, Room 29

Associate Professor Ray

This Department is equipped with all of the latest improved instruments and apparatus used in mine engineering, surveying and the study of mine ventilation. There is a collection of models of mine machinery and supplies, to which additions are being made which are valuable as illustrations. The draughting room is large, well lighted and provided with a desk for each student, where he is personally taught map making and the platting of actual surface and underground surveys; the making of tracings of drawings and how to make blue-prints. He is also taught proper methods of keeping notes and all records necessary to an efficient engineer's office. The students are given practical experience by making actual surveys of coal mines and in working up their notes complete in all of the necessary details. The students are also taught how to make working drawings, plans, estimates and specifications of mining operations and equipment.

The lecture room has arrangements for projecting photographs of machines, mines and mine equipment, for class illustration, and there is a collection of such views. Also a photographic room with blue-printing facilities, where students learn to make copies of the drawings made by themselves and those used in illustrating the lectures.

The Mining Engineering Course pays special attention to underground surveying, mapping, timbering, ventilation and other matters relating to safety and speed, system and method in extracting coal and other minerals.

The coal mines of central Ohio are easily accessible to the University and furnish an extremely valuable field for illustrating the practical systems and methods of mine surveying, systems of mining, timbering, haulage, drainage and ventilation, tipple construction and general arrangement of mining plants.

During their course the mining students are required to make frequent trips and to spend sufficient time at the mines in actual work and observation to become familiar with practical mine surveying and the details of mine equipment and management. This work is further supplemented by visits to shops or public works, which afford practical illustrations of Engineering work in the process of construction.

1. **Mine Surveying.** Lectures and field practice. This is similar to Course 4, but more elementary. The same text is used. The students have more practice in the drawing room. Five times a week. (First Term, second year, Short Course in Mining.)

CLASS IN MINING ENGINEERING AT WORK SURVEYING IN COAL MINE

2. **Ventilation and Haulage.** Lectures illustrated by experiments and maps of mines and models when possible, tests by safety lamps and anemometers. and methods of air distribution in coal mines. Five times a week. (Second Term, second year, Short Course in Mining.)

3. **Mine Operating.** A course of lectures and practical instruction in mine book-keeping and accounts, cost of working, etc., particularly adapted to Ohio coal mining. Five times a week. (Third Term, second year, Short Course in Mining.)

4. **Mine Surveying.** Field practice in the use of instruments for surface and underground surveys. Full notes are taken and maps and plans made in the drawing room. Davies's Surveying, by Van Amringe, is used as a text-book. Five times a week. (First Term, third year, Courses in Mining Engineering and Ceramics.)

5. **Mine Engineering.** Lectures. Mine operating, mining machinery, ventilation, shaft-sinking, working out deposits, etc. Constant reference is required to the standard works and to the leading technical journals, with practice in designing mine plants, draughting and estimates. Five times a week. (First, Second and Third Terms, fourth year, Course in Mining Engineering.)

6. **Plans and Specifications.** Five times a week. (Third Term, fourth year, Course in Mining Engineering.)

PHYSICS

Office, University Hall, Room 13

Professor Thomas, Assistant Professor Boyd, Mr. Kester, Mr. Brown.

The Department of Physics occupies the west half of the first two floors and basement of University Hall. The first floor rooms are the principal lecture room, fifty–five by thirty–eight feet; the elementary lecture room; an instrument room; and the office of the Department. On the second floor are rooms for elementary laboratory work, and a dark room for photographic work, in connection with spectrum and Roentgen–ray apparatus. The lecture room on the first floor is also used in laboratory work. In the basement, provision is made for advanced exercises in electricity, heat, etc. The basement plan on an adjoining page gives a general idea of its arrangement, and of the character of the work provided for.

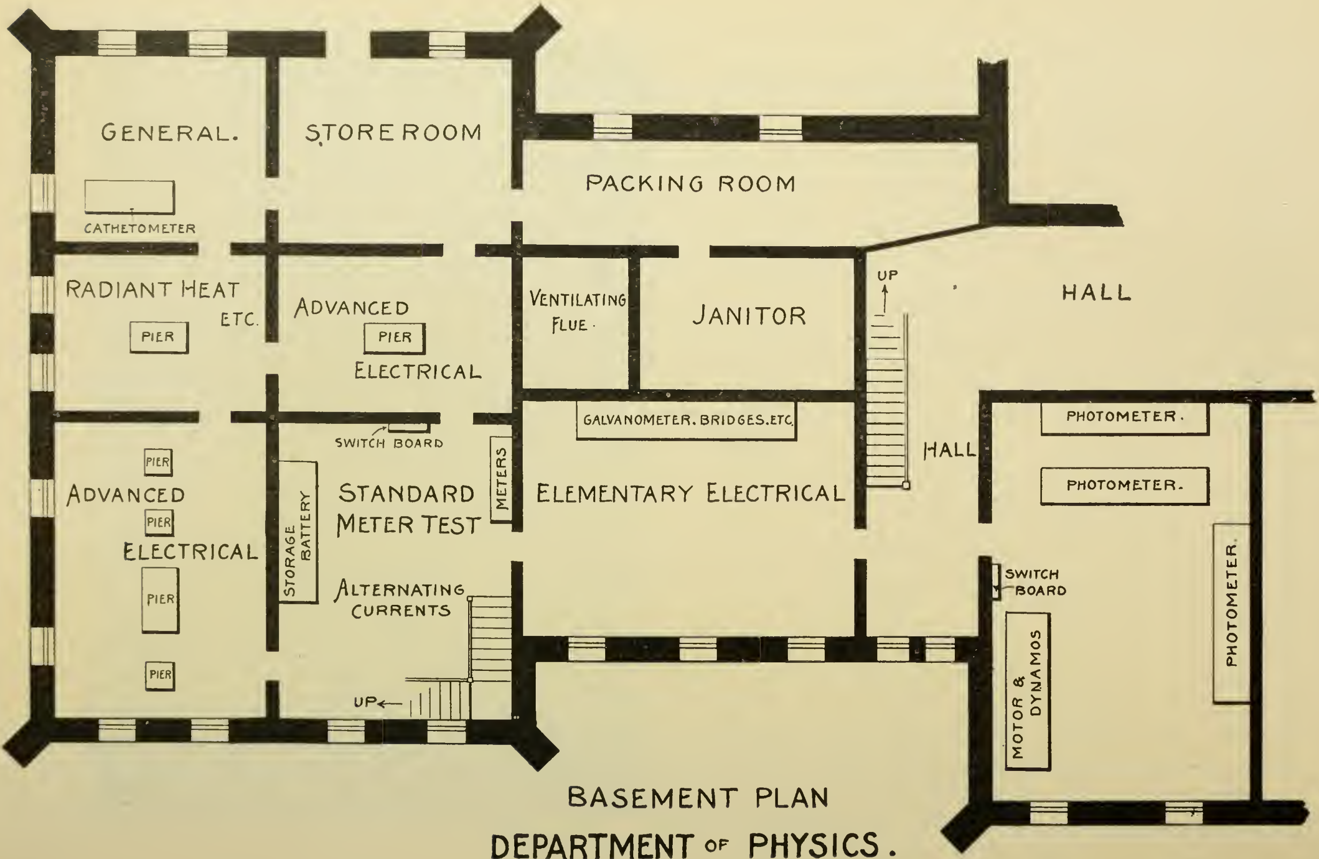
The Department has an excellent equipment of apparatus, to which additions are constantly being made. The apparatus includes a large collection of pieces for illustration of the general lecture room work, but is principally chosen for accurate measurement in the laboratory. A set of standards of length, capacity and mass, sent under the act of Congress supplying such sets to the several agricultural colleges, is in the possession of the Department. The pieces are copies of the United States standards made by the Coast Survey at Washington.

Among the principal pieces of apparatus are a dividing machine by Fauth & Co.; chronometers by Parkinson & Frodsham and by Negus, the latter a break–circuit; a chronograph by Fauth & Co.; a Hipp's chronoscope; cathetometers by Salleron and by the Geneva Society, the latter an exceptionally fine instrument; Regnault's apparatus for vapor tension, for expansion of gases and for specific heat; Melloni–Tyndall apparatus for radiant heat; standard thermometers by Baudin and others; Rutherford and Rowland diffraction gratings; Rowland's spectrum photographs, spectroscopes by Brashear, Browning, Apps and others; Salleron's complete apparatus for projections in polarized light; lanterns for projections by the lime light and the arc light; a variety of sound apparatus from Koenig; portable and quadrant electrometers; Kelvin galvanometers of high and low resistance; Weidman, Kohlrausch and other galvanometers; standard resistance coils, with Cavendish laboratory certificate; several sets of resistance coils and bridges; a Kew magnotometer; Kelvin standard balances; Weston ammeters and voltmeters; standards of self–induction; standard battery cells; photometric standards and photometers; X–ray apparatus, etc.

Under the laws of Ohio, the professor of Physics is ex-officio State Sealer of Weights and Measures, and all of the standard weights, measures and balances received from the United States government are in the rooms of the Department.

1. **Elementary Physics.** Recitations and experimental lectures. Five times a week. Text: Carhart & Chutes' "Elements of Physics." (First and Second Terms, first year, Short Courses in Mining and Clay-working; and second year, Short Course in Industrial Arts.)
2. **Mechanics and Heat. Electricity and Magnetism, Sound and Light.** Lectures and recitations. Three times a week. (First, Second and Third Terms, second year, all four-year courses.)
3. **Physics.** Extension of Course 2, with practice in solution of problems. Twice a week. (First, Second and Third Terms, second year, Courses in Electrical Engineering, Ceramics, Industrial Arts and Manual Training.)
4. **Electricity and Magnetism.** Lectures and recitations. Three times a week. (First Term, third year, Course in Electrical Engineering.)
5. **Physical Laboratory.** Elementary manipulation. Length, mass and time measurements. Work in density, elasticity and in heat. Four times a week. (Third Term, second year, Course in Electrical Engineering.) (Alternative with Chemistry 20 and 21. First, Second and Third Terms, third year, Course in Manual Training.)
6. **Physical Laboratory.** Theory and practice of magnetic and electrical measurement, including the testing and standardizing of instruments; conductivity of conductors; insulations, capacity and resistance of insulated conductors and cables; temperature coefficients; commercial measuring and testing instruments; strength and distribution of magnetic fields; magnetic moments, permeability; work in light, including optical constants; spectroscopy; photometry of gas, electric and other lights. Five times a week. (First and Second Terms, third year, Course in Electrical Engineering.)
7. **Physical Laboratory.** (Twice a week, Second Term, three times a week, Third Term, second year, Course in Mechanical Engineering.) Three to five hours a week, First, Second and Third Terms, General Elective.

9. **Physical Laboratory.** A second year's work in Physical Laboratory. Three to five hours a week. Course 9 must be preceded by Course 7. Elective.



BASEMENT PLAN

DEPARTMENT OF PHYSICS.

PHYSIOLOGICAL LECTURE ROOM, BIOLOGICAL HALL

PHYSIOLOGY

(DEPARTMENT OF ANATOMY AND PHYSIOLOGY)

Office, Biological Hall, Room 12

Professor Bleile, Assistant Professor Morrey, Mr. Dresbach

8. **Bacteriology.** One lecture, one laboratory period, a week. (Second Term, fourth year, Course in Chemistry.)

POLITICAL SCIENCE

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE)

Office, University Hall, Room 15

Professor Knight, Dr. J. B. Sanborn

53. **Political Institutions of the United States.** Lectures and recitations. A study of the origin and nature of the political institutions of the United States, and an analysis of the form and powers of

the government. Bryce's *American Commonwealth;* Burgess's *Political Science.* Three times a week. Open only to students who have had History 55 or 56. (First Term and first half Second Term, fourth year, Courses in Industrial Arts and Manual Training.)

RHETORIC

(DEPARTMENT OF RHETORIC AND ENGLISH LANGUAGE)

Office, University Hall, Room 44

Professor Denney, Assistant Professors Graves, McKnight, Allen, and Mr. Parker

3. **Advanced Rhetoric.** *Twice a week.*
    A. Prescribed readings in the literature of technology and science; and the analysis of specimens of this literature. *Once a week.*
    B. Reports, abstracts, memoranda, and notes of lectures and of articles in the technical journals; practice in drawing specifications and writing brief papers on technical and scientific subjects. *Once a week.*
    Two hours a week. (First, Second and Third Terms, second year, Courses in Industrial Arts, Manual Training, and Electrical and Mechanical Engineering; third year, Courses in Architecture, Ceramics, Chemistry, and Civil and Mining Engineering.)

5. **English Composition.**
    A. Scott and Denney's Paragraph-Writing; Macauley's Warren Hastings; Cairn's Forms of Discourse; Themes. *Twice a week.*
    B. Oral practice with the instructor in public speaking. *Once a week.*
    (First, Second and Third Terms, first year.) *Three times a week.* Credit two and one-half hours. All four-year courses.

4. **Advanced Composition.** Twice a week. **Elective.**

SHOPWORK

DEPARTMENT OF INDUSTRIAL ARTS

Office, Hayes Hall, Room 2

Professor Sanborn, Mr. Knight, Mr. Renck, Mr. Crowe, Mr. McIntire

Note. — For time requirements, credit given, and all similar information concerning shopwork courses, see table page —

3. **Foundry Work.** Exercises and practice in tempering sand and preparing moulds of machine parts in the sand, core-making, melting iron and brass and pouring castings.

4. **Chipping and Filing.** Exercises and practice in vise work, including chipping in cast and wrought iron, surface filing, squaring, fitting, finishing, and the scraping of surface plates.

7. **Carpentry and Pattern Making.** Exercises and practice in carpentry, wood-turning and pattern making, including sawing, planing, mortising, splicing, framing and other work involving the use of the ordinary carpenter tools; center and chuck turning; the making of finished patterns; and enough elementary molding to illustrate draft, parting, cores, etc.

8. **Carpentry: Cabinet Work.** Exercise and practice in cabinet making, including panelling, mitre and dovetail joints, etc.; use of power tools.

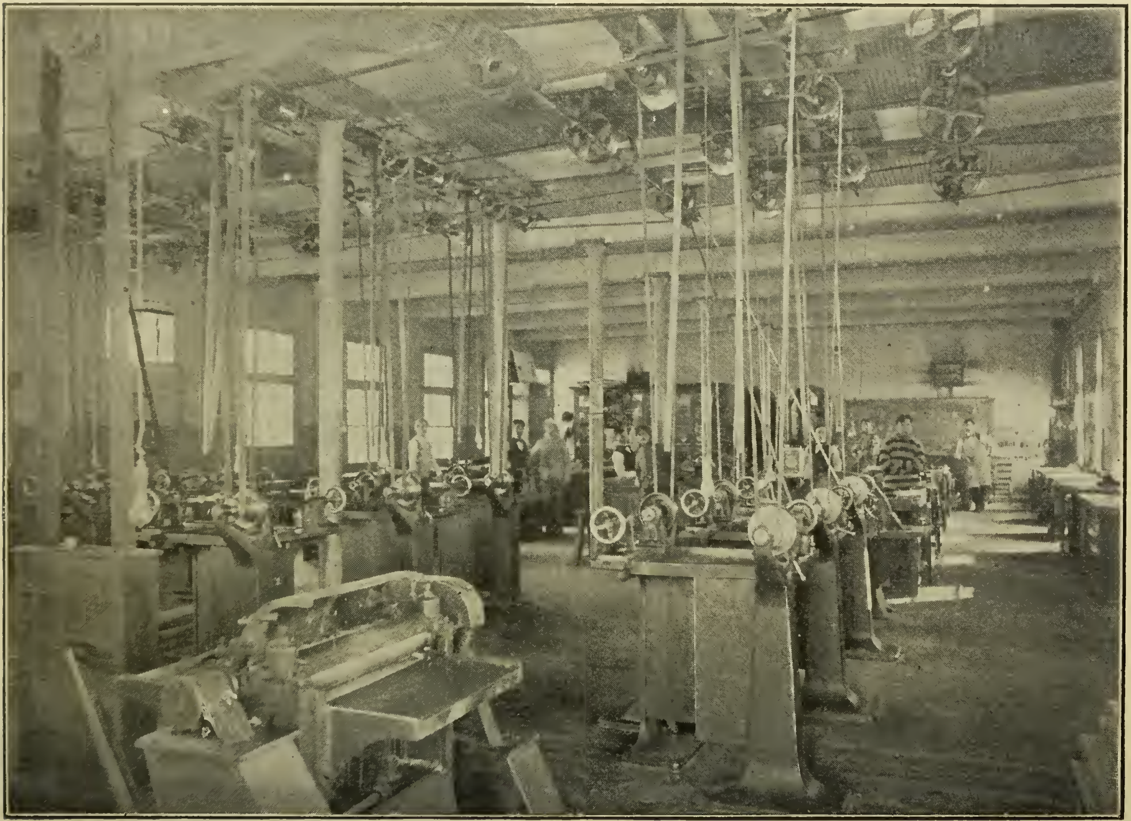
9. **Advanced Pattern Making.** Continuation of pattern work of Shopwork 7.

11. **Forging.** Exercises and practice in iron and steel forging, including such operations as drawing, bending, forming, upsetting, welding and the making and tempering of punches, drills, chisels, lathe tools, and springs.

12. **Advanced Forging.** Tool making, tempering of taps, dies, cutters, etc.; annealing; case hardening; ornamental iron work, etc.; visits to shops.

13. **Machine Work.** Exercises and practice in hand-turning in iron anl brass on speed lathes; in straight and taper turning, boring, fitting, chucking, and thread-cutting on engine lathes.

14. **Machine Work.** Exercises and practice on the lathe, planer, shaper, drill press and milling machine, with use of small tools as drills, taps, dies, reamers, counterborers, etc.; construction of parts of actual machines.



INDUSTRIAL DEPARTMENT — WOODWORKING SHOP

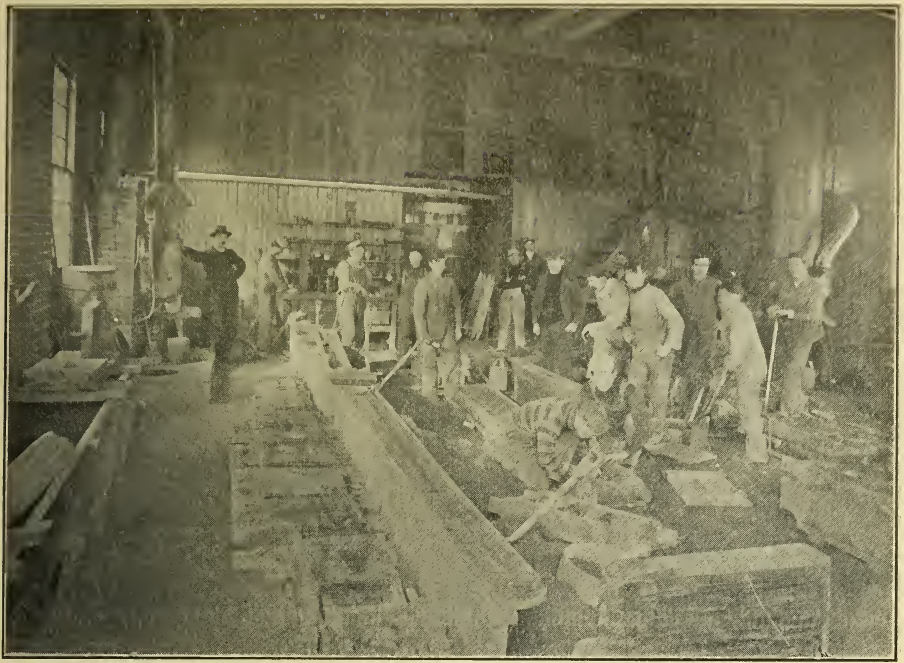
15. **Advanced Machine Work.** Exercises and practice on turret lathe, universal, surface and tool grinding machines, gear cutting, etc.

16. **Advanced Machine Work.** The construction and use of jigs and templates; the accurate laying out of work; the duplication of parts, the production of work rapidly and economically, etc.

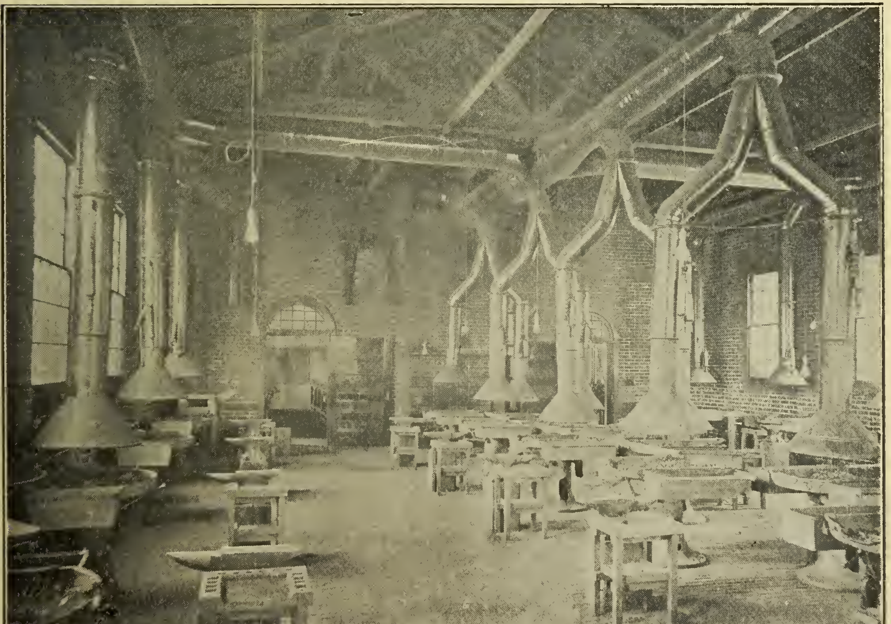
17. **Advanced Machine Work.** The making and use of special tools and fixtures, standard plugs and collars, standard caliper and limit guages; error limits in modern machine construction; methods of testing the accuracy of machine tools, etc.

Shopwork Required

Number	Credit	Year	Term	Courses in	Number	Credit	Year	Term	Courses in
3	2	2	1	M. E.: I. A. (short).	11	2	2	2	E. M.
	3	2	1	I. A.: Man. Tr.		3	2	2	Chem.: I. A.: Man. Tr.
						3	1	3	Clay-w'k.(short):I.A. short)
4	2	2	1	E. E.		3	2	3	Mining (short).
	3	3	1	I. A.: Man. Tr.		3	3	3	Cer.
	3	2	1	I. A. (short).					
	3	2	2	M. E.	12	3	2	3	I. A.: Man. Tr.
	2	1	3	Clay-w'k (short).					
	2	2	3	E. M.	13	3	2	2	E. E.
	3	4	1	Cer.		3	3	2	I. A.: Man. Tr.
						5	2	2	I. A. (short).
7	3	1	1	I. A. (short).		3	2	3	M. E.
	3	2	1	Chem.: I. A.: Man. Tr.					
	2	2	1	E. M.	14	3	3	1	M. E.: E. E.
	4	1	3	E. E.: M. E.		3	3	3	I. A.: Man. Tr.
8	5	2	3	I. A.: Man. Tr.	15	3	4	1	I. A.: Man. Tr.
						4	3	2	M. E.
9	3	2	2	I. A.: Man. Tr.		5	2	3	I. A. (short).
	3	1	2	I. A. (short).					
					16	3	4	2	I. A.: Man. Tr.
11	2	2	1	E. E.					
	3	2	1	M. E.	17	3	4	3	I. A.



INDUSTRIAL DEPARTMENT—FOUNDRY



INDUSTRIAL DEPARTMENT—FORGEROOM

THE UNIVERSITY POWER PLANT

The buildings of the power plant were completed in 1896, and, with their contents, form a model plant. The boiler room is 38 by 100 feet, and is equipped with five 150 H. P. boilers, with Babcock and Wilcox chain grates and Murphy automatic stoker. There are also coal and ash conveyors for the whole plant. At one end of the boiler room is the coal room, and at the other the pit for the hot well, from which runs the tunnel (about three-fourths mile in length) to the buildings of the University, carrying heat, gas and water-pipes and power, light and other wires.

Near the boiler house is the power house, 40 by 60 feet. The power generating plant consists of a 70 Horse Power McEwen compound engine, belted to a 60 kilowatt 2-phase Westinghouse Alternator, and a 200 Horse Power Watertown Compound, direct connected to a 125 kilowatt 2-phase generator. These occupy the main floor, together with a complete marble switchboard, with ammeters, voltmeters, wattmeters, static ground detectors, etc. A ten-ton traveling crane is available for handling the machinery in this room.

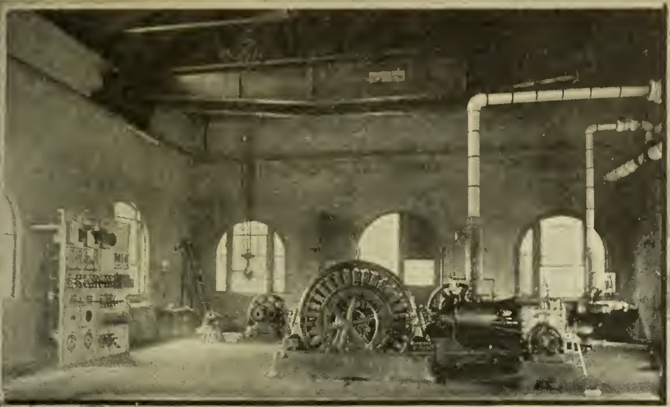
In the basement are condensers, which get their water from a large cooling reservoir at the side of the building. Here also are the transformers that convert the current to be used in the motors scattered over the campus, from 1100 volts, at which it is generated, to 400 volts, at which it is transmitted.

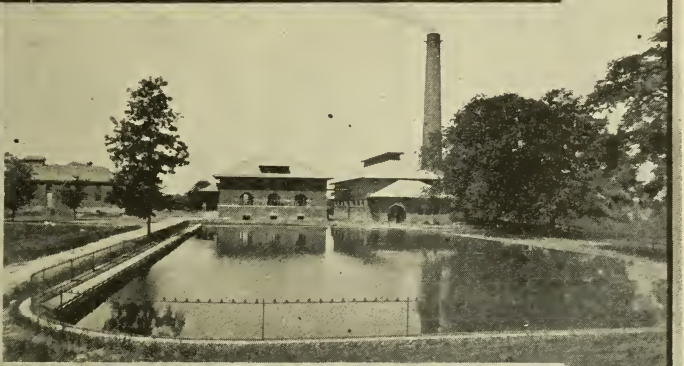
There are installed on the campus over eighteen hundred incandescent lamps, twenty-four arc lamps and about 250 H. P. in motors. The electric plant is for the most part of the Westinghouse system. The buildings are of brick. Nearly all of the University buildings are heated by steam from this plant. The total cost of the plant for generation of power, light and heat, and for its transmission to the buildings, has been something over $100,000.

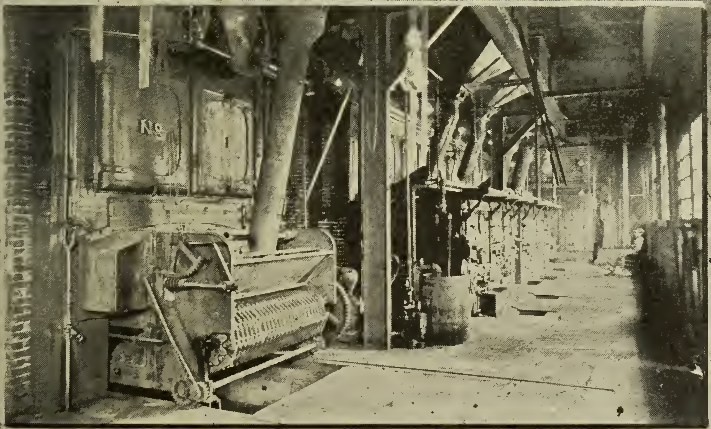
The views on the opposite page show the interiors of the engine house and boiler house above and below and in the center, a view of the whole plant, looking west across the reservoir.

During the present year, a very excellently equipped experimental steam boiler of 100 H. P. capacity has been donated to the University by Dr. Stillman W. Robinson, Emeritus Professor of Mechanical Engineering. This boiler, one of the most complete things of the kind ever erected, will be located in the Boiler House, but it will belong to the Experimental Engineering laboratory of the Department of Mechanical Engineering, and be under its supervision and control.

This gift, for the special prosecution of experimental research, adds greatly to the opportunities offered to students by the already extensive power and electric plants.







ENGINE ROOM
POWER PLANT—FROM EAST
BOILER ROOM

GYMNASIUM

The University, understanding the importance of the physical development of its students has provided one of the best gymnasiums in the country for their use. It has a floor eighty feet wide and about twice as long, well equipped with dumbbells, clubs, poles, chest-weights, horizontal, vertical and parallel bars, swinging rings, ladders, basket ball, and other apparatus. The running track is in a gallery surrounding the room and is raised at the corners and padded. The roof which is carried on steel arches is high and the room is well lighted from above. The greater part of the basement is occupied by two sets of bath and locker rooms for the men and women. Both are supplied with large swimming pools and shower baths. Besides there is a restaurant where board and lunches can be obtained. Besides these there are offices for the Gymnasium Director and Military Commandant, also a boxing room and hand ball court. The building completed in 1898, is of brick, and built in mediaeval style.

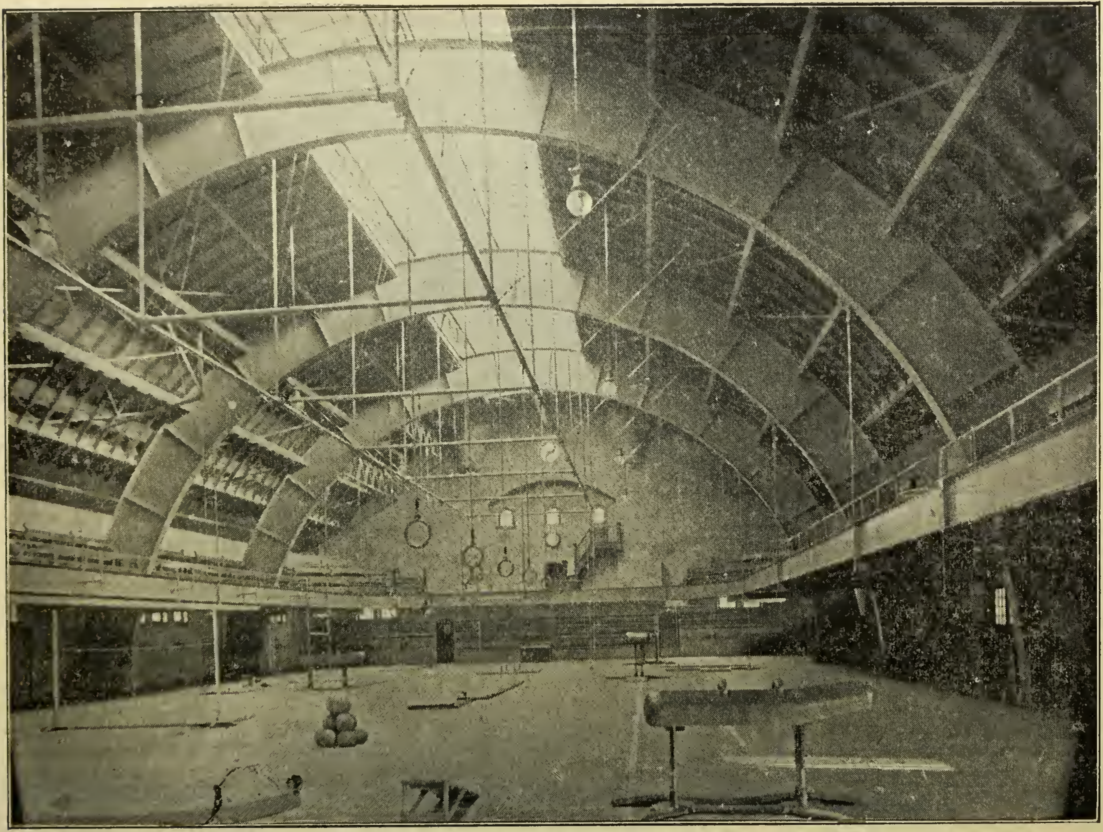
ATHLETIC ASSOCIATION

Another important factor in the physical development of the students is the University Athletic Association, which is managed by a board made up of three members from the Faculty, three from the Alumni, and four from the student body. This board has complete charge of all intercollegiate events and does all in its power to promote base-ball, foot ball, tennis, basket ball, and track and other athletics.

The Association is in a most flourishing condition and the interest of the students generally in the matter is great and increasing. The Association has one of the finest athletic fields in this part of the country. It is believed by the members of the Faculty that a well directed and controlled participation in athletics tends to improve the character of the University work.

MILITARY DRILL

The same building used as gymnasium is also employed as Armory and Drill Hall by the University Battalion. This is in charge of a Commandant from the United States Army, apart from whom it is officered entirely by the students. Since participation is required of all students during the first two years of their course, the size of the battalion is such as to make interesting manuevers possible. Besides its military importance as shown by the prominent place taken by former students among the Ohio troops sent to the late war, the great value of this work in the physical development of the students is thoroughly recognized by all educators. Three hours a week are devoted to the drill.



GYMNASIUM

STUDENT ORGANIZATIONS

One of the most commendable organizations in the University is a branch of the International Young Men's Christian Association, organized in 1883. It has a large membership and steadily grows in influence. Services are held weekly. New students are made cordially welcome, and young church members will here enjoy Christian influences and fellowship in college life.

LITERARY SOCIETIES

There are five literary societies in the University, three of which are open to young men. These are the Alcyone Literary Society, founded in 1874, the Horton Literary Society, founded in 1875 and the Athenian Literary Society, founded in 1896 Each of these societies has commodious and well furnished apartments in University Hall. They meet weekly, and their work, offering to the student a very desirable training in composition, public speaking, and parliamentary order, is a very valuable adjunct to a collegiate education, especially to students engaged in the technical courses, whose prescribed work includes much less of this sort of training is given to students in the academic lines.

TECHNICAL SOCIETIES

The Engineering Society is an organization composed of instructors and students who meet biweekly to read and discuss questions of general interest among engineers. The society aims to assist the students as early as possible in their course to begin the habit of accurate observation and description of engineering work wherever it may be met; also to develop the habit of constant study of periodical engineering literature and to stimulate among all classes of engineers an intelligent appreciation of the great works of engineering of every age and of every kind.

The effect of such a society is a most valuable supplement to the literary societies, as it gives practice in the art of presentation of technical subjects and in extemporaneous speaking and argument. It forms the most fitting training school to the technical societies with which engineers are likely to affiliate after graduation.

The Chemical Association is a similar body drawing its membership principally from the students and instructors of the Departments of General Chemistry, Agricultural Chemistry, Pharmacy, Metallurgy and Ceramics. The meetings are biweekly, and comprise a major and a minor paper with the usual oportunity for questions and discussions.

The Ceramic Association is an organization maintained by the students of the Ceramic Department, for the discussion of questions relating to their work. It was organized in 1895 and has been the source of much pleasure and profit to its members.

AUDITORIUM

ADMISSION

MODES OF ADMISSION

The entrance examinations for 1900 will be held on Monday, Tuesday and Wednesday, September 17, 1900.

Applicants for admission to the College of Engineering must be at least seventeen years of age, and must be provided with credentials of scholarship from their last instructors, or from the last institution with which they have been connected, and with certificate of good moral character.

There are three modes of admission to the University:

1. **Certificates.** Certificates of the preparatory departments of Colleges of approved standing and of Normal schools in Ohio are accepted, if found satisfactory, in lieu of examination for preparatory studies, under the following conditions:

Each certificate must contain a detailed statement of the studies pursued, the text-books used, the amount of work done in each study, the amount of time devoted to it, the date of the examination, and the applicant's rank or standing in it. A copy of the course of study should accompany the certificate; and both should be sent to the University not later than the first of September. The University cannot promise this recognition to certificates presented during the entrance week.

Blank certificates will be furnished on application.

Applicants for admission who come from other Colleges or Universities are required to bring certificates of honorable dismission.

Teachers' certificates (in force) will be accepted at their face value.

2. **High School Diplomas.** From time to time the University approves the courses of study in certain High Schools of the State; and the graduates of these High Schools are admitted on presentation of cards issued to them at their graduation, through their principals.

3. **Examination.** All other applicants are subject to examination on the groups of studies mentioned below.

REQUIREMENTS FOR ADMISSION TO THE FOUR-YEAR COURSES

1. Mathematics.

In addition to a thorough knowledge of arithmetic, the mathematics required comprise:

a. **Algebra.** Taylor's Academic Algebra is preferred, but Wentworth's, White's or Wells' Elements are accepted.

b. **Geometry, Plane.**
c. **Geometry, Solid.** } Venable's, Wentworth's, White's or Wells'.

NOTE — Deficiencies in Mathematics are particularly unfortunate for a student in Engineering. No one will be admitted who is deficient in more than the equivalent of five hours. (Five hours signifies the amount of work required by a daily recitation, five days a week, for one term or one third of a school year.)

2. English.

In addition to a good knowledge of Grammar, there is required:

d. **Composition and Rhetoric** in the amount prescribed in Scott and Denney's Composition-Rhetoric.

In examinations, the applicant will be tested as to his ability to write clear and correct English. The test will be the writing of two essays, of about two hundred words, on familiar subjects and concerning familiar books.

e. **English Classics.**

Questions will be set for the purpose of testing the applicant's knowledge of the subject matter, form and substance, of the following books, with the plot, purpose, literary style and peculiarities, incidents, and characters of which the applicant should make himself thoroughly familiar:

1900. Chaucer's The Knight's Tale, or Dryden's Palamon and Arcite; Milton's Paradise Lost, Books I and II; Pope's Iliad, Books I. IV, XXII and XXIV; The Sir Roger de Coverly Papers in The Spectator, Goldsmith's The Vicar of Wakefield, Scott's Ivanhoe, Cooper's The Last of the Mohicans, Macauley's Essay on Milton, Burke's Conciliation with the Colonies.

1901. Macbeth, Burke's Conciliation with the Colonies; Macaulay's Essays on Milton and Addison; Milton's Comus, Lycidas, L'Allegro, Il Penseroso; Scott's Ivanhoe; Goldsmith's The Vicar of Wakefield; Tennyson's Princess; Coleridge's The Ancient Mariner; Lowell's The Vision of Sir Launfal.

3. Language.

A knowledge of one language other than English is required for admission. French or German is preferred, but Latin will be accepted. Students preparing for an Engineering course are advised to take as early an opportunity as possible to begin the study of a modern language.

Those entering with French or German will be required to pursue the same language, except where the course elected prescribes otherwise.

f. **Latin** — Pronunciation (the Roman method); Grammar (an exact knowledge of the inflections is essential); Cæsar, the first four books of the De Bello Gallico.

g. Or **French** — The whole subject of French Grammar. Applicants will be expected to read at sight easy French and to translate correctly into French, simple English sentences.

h. Or **German** — Joynes–Messner's German Grammar, complete; Joyne's German Reader, complete; Hauff's Liechtenstein, Lessing's Minna von Barnhelm, Huss's Sessenheim and Buchheim, Goethe's Dichtung und Wahrheit.

Note. — Students unable to meet these language requirements will be admitted with entrance conditions as follows:

Those entering with Latin will be permitted to make good their deficiency by an equivalent amount of work in French or German. For this work they will receive no college credit.

For the year 1901–1902 those entering with no training in Language will be permitted to make good their deficiency by beginning either French or German in the College. For this work they will receive no college credits.

4. History.

i. **United States History.**

j. **General History.** Myer's Preferred.

k. **Civil Government.** Fiske or Thorpe preferred.

5. Science.

l. **Physics.** Carhart and Chute, Gage, Avery or an equivalent.

m. **Physical Geography.** Geike's Elementary Lessons or its equivalent.

Note — An applicant for admission who may be somewhat in arrears in any given subject, will find opportunity to make up this work in the Columbus High Schools, which are fully accredited by the University.

No student will be admitted to the College of Engineering who is in arrears more than fifteen hours of work other than Langugage, and of this amount not more than five hours may be in Mathematics.

REQUIREMENTS FOR ADMISSION TO THE SHORT COURSES

Applicants must not be less than sixteen years of age, and unless they are over twenty-one years of age must pass an examination in Arithmetic, Geography, Grammar and Orthography, or bring High School or other certificates for these branches.

Applicants who are over twenty-one years of age are admitted without examination.

ADMISSION TO SPECIAL STUDIES.

Students who desire to pursue special lines of work in the University, and do not desire to become candidates for degrees, will be admitted on the following conditions:

1. The regular entrance requirements must be satisfied.

But applicants who are not less than eighteen years of age, after obtaining credit for elementary or "grade" work, and for such other subjects as may be necessary to qualify them for the classes that they wish to enter, may, on the presentation of satisfactory reasons, be admitted by the Faculty to any class in the College; provided, that if any student who has been admitted on these conditions afterwards becomes a candidate for a degree, he shall take the omitted entrance examinations at least twelve months before the degree is conferred.

2. On entering the College, students desiring to pursue special work are required to lay before the Faculty, for approval or modification, a written statement of the end they have in view, the studies proposed for the attainment of that end, and the probable period of attendance. Such students will be held as strictly to their accepted schemes of work as are the regular undergraduates to their courses of study.

3. *Permission to enter as special undergraduates will be refused to all who fail to give satisfactory evidence of definiteness of purpose and will be withdrawn whenever the conditions on which it was granted cease to exist.*

ADMISSION TO ADVANCED STANDING

1. Applicants who do not come from some other University or College must first obtain admission in the manner already described They will then be examined on the undergraduate studies for which they ask credits.

2. Applicants who come from the collegiate department of an approved College, and who bring explicit and official certificates describing their course of study and scholarship, and also certificates of honorable dismission, will be admitted without examination, except such as may be necessary to determine what credit they are to receive here for work done in the College from which they come.

ATTENDANCE

REGISTRATION

All students are required to register and pay their term fees on or before the first day of each term, between the hours of 8:00 a. m. and 12 m., or between 1:00 and 4:00 p. m., central standard time.

Former students who fail to register as above will be charged one dollar in addition to the usual incidental fee, for the first day of delinquency, and fifty cents additional for each subsequent day.

No candidate for graduation will be permitted to register for the second term of his graduating year, except upon presentation to the Bursar of the President's certificate that his thesis subject has been announced and approved.

AMOUNT OF WORK

No student is permitted to take less than fifteen credit hours a week of any sort of work, except by special permission, and no student will be permitted to take more than the regular work of the class to which he belongs, who has not passed all his work for the preceding term. A credit hour means one hour class room work in lecture, recitation or quiz, or two hours of laboratory work, once a week for one term.

ELECTIVE STUDIES

All elections of work in continuous studies, when once made, are understood to be made for the entire collegiate year.

The right is reserved to each professor to withdraw the offer of any elective study when it is not chosen by at least four persons.

CONSULTATION

For consultation or information regarding work in any class or department, students will apply to the professor or instructor in charge.

For consultation or information in regard to their status as members of the College of Engineering, or for the filing of petitions, changes of course, changes of class cards, adjustment of schedules and similar needs, students will apply to the Secretary, who can be found every school day at his desk in the Chapel, University Hall, from 9 to 10 a. m.

On matters affecting their connection with the University, or in any way connected with the discipline of the institution, students will apply to the President of the University.

EXAMINATION AND STANDINGS

At the close of any term a student failing to pass in two-thirds of his work will be considered on probation; and a second similar failure incurred within the following ten academic months will forfeit his connection with the University.

GRADUATION

THESIS

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of this study must lie within the field of the degree sought. The subject must be announced to the President of the University (dependent upon the approval of the head of the Department), not later than the beginning of the second term of the fourth year; and the completed thesis must be presented on standard paper of certain size and quality, typewritten, bound, and titled, not later than the second Saturday before Commencement Day.

DEGREES

The degree of Civil Engineer in Architecture is conferred on those who have completed the course in Architecture; that of Engineer of Mines in Ceramics to those who have completed the Course in Ceramics; that of Bachelor of Science in Chemistry on those who have completed the Course in Chemistry; that of Civil Engineer on those who have completed the Course in Civil Engineering; that of Mechanical Engineer in Electrical Engineering on those who have completed the course in Electrical Engineering; that of Bachelor of Science in Industrial Arts on those who have completed the Course in Industrial Arts; that of Bachelor of Science in Manual Training on those who have completed the Course in Manual Training; that of Mechanical Engineer on those who have completed the Course in Mechanical Engineering; that of Engineer of Mines on those who have completed the Course in Mining Engineering.

Except by unanimous consent of the Faculty, no candidate for graduation will be recommended for a degree whose record is not in all respects complete by the Friday evening previous to the Commencement Day on which he seeks the degree

EXPENSES

FEES

Each student is required to pay an incidental fee of fifteen dollars a year, and the usual fees for the expenses of laboratory work. Tuition is free.

Laboratory Fees. — Students in the laboratories and shops are required to pay fees to cover, in part, the cost of the material consumed, and the deterioration of the expensive instruments used by them. The fees charged per term in the laboratories mentioned below are as follows:

Ceramics, 4, 5, 6, 9, 10, 11, 12	$5 00
Drawing, 7	2 00
Electrical Engineering, 4 and 5 (4 or 5 hrs.), $7; (3 hrs. or less)	5 00
Gymnasium	1 00
Shop Work, 4 hrs. or less	5 00
Shop Work, 5 hrs. or more	7 00
Mechanical Engineering, 12, 13, 14, 15, 16, 17	5 00
Physics, 5, 6, 7, 9 (3 hrs.), $5; (over 3 hrs.)	7 00

In the laboratories of the Department of Chemistry, Ceramics and Metallurgy, each student is required at the beginning of each term to pay a fixed charge of one dollar and fifty cents for gas and water. He is also required to buy his own supplies, which may be obtained at the store-room in Chemical Hall. With reasonable care, this expense need not exceed $5.00 per term.

All term dues must be paid at the opening of each term as a condition of admission to classes.

A fee of five dollars to cover expenses of graduation, diplomas, etc., is required of each person receiving one of the ordinary degrees from the University, and this fee must be paid before the degree is conferred.

OTHER EXPENSES

There are two dormitories on the University grounds for the use of students. Each occupant is charged by the University a rent of one dollar and fifty cents a term.

The South Dormitory affords unfurnished rooms to such students as desire to board themselves, and thus to reduce their expenses to a minimum. The expense of living in this way falls below two dollars per week. Applications for room should be made to the President of the University.

The North Dormitory will accommodate more than sixty students. Board, furnished rooms, fuel, light and washing are, at present prices, supplied for about three dollars and twenty-five cents a week. Students will be admitted on special recommendation to the President of the University.

Boarding clubs are also formed in the neighborhood of the University. Furnished rooms are rented at seventy-five cents to one dollar a week for each student, and the cost of board is two dollars to three dollars a week.

Board, with furnished rooms, can be obtained in private families, within convenient distances of the University, at rates varying from four dollars to five dollars a week. The ruling rate may be taken as four dollars.

The uniform with which the members of the battalion are required to provide themselves costs about fourteen dollars. It is quiet in pattern, and is designed to be worn daily in place of civilian dress.

The expenses of a student in this College for a year may be estimated as follows, excluding clothing (except uniform) and traveling expenses:

	Low.	Average.	High.
Incidental fees	$15 00	$15 00	$15 00
Laboratory fees	15 00	15 00	54 00
Books and stationery	15 00	25 00	40 00
Room	4 50	37 00	75 00
Furniture	10 00	....	....
Board	70 00	110 00	150 00
Uniform	14 00	14 00	14 00
	$143 50	$216 00	$348 00

The second and third estimates for room include light, fuel and care. The third estimate is for a room occupied by a single student. The requirements for laboratory fees and books depend upon the course of study pursued.

SELF-SUPPORT

There is a large amount of work upon the University farm and in the shops and laboratories assigned to students, preference being given to those who are studying Agriculture or one of the Engineering Courses. But the University cannot promise work to all applicants. Many students find work in private families, in offices, and in various occupations, by means of which they defray at least a portion of their expenses. A person of ability and energy, who is master of a trade, or who can do good work of any kind, can generally find remunerative employment. It has seldom been known that any student of ordinary energy and industry was obliged to leave the University because of a lack of money for necessary expenses, after having been sixty days on the ground — or long enough to inform himself as to the opportunities for securing employment. An employment bureau is maintained at the University, where the names of those seeking work and of those desiring workers are recorded.

WINTER SCENE ON THE CAMPUS

ENROLLMENT

1899--1900

Graduate Students	11
Students in Courses leading to Degrees	337
Students in Short Courses	35
Special Students	15
Total	398

CLASSIFICATION BY COURSES

	Graduate	Four Year	Short Course	Special	Total
Architecture			11		11
Ceramics	3	8	11		22
Chemistry		21		2	23
Civil Engineering		78		3	81
Electrical Engineering	2	101		3	106
Industrial Arts		4	7	1	12
Mechanical Engineering	3	83		5	91
Mining Engineering	3	31	17	1	52

GRADUATE STUDENTS

Name.	*Course.*	*Address.*
Edwards, Clarence J. B. S. Pacific College.	Cer. S	Newberg, Oregon.
Ford, Nile Otis A. B. Washington and Jefferson.	E. M	Wheeling, W. Va.
Grate, Charles A. M. E. Ohio State University.	M. E.	Yale.
Groves, John Wesley C. E. Ohio State University.	E. M	Batavia.
Hale, Frederick James M. E. Ohio State University.	M. E.	Mogadore.
Ludlow, Stephen H. B. S. Albion College.	*Cer	Union City, Ind.
McIntire, Alfred Heber E. E. Ohio State University.	M. E.	Mt. Vernon.
Schlochtermeyer, Carl Fred A. B. St. Xavier College.	E. E.	Cincinnati.
Somermeir, Edward Everett G. Ph. Ohio State University.	E. M	Westwood.
Williams, Ira A. B. S. Iowa State College.	*Cer	Ames, Iowa.
Wynne, Francis Edmund B. A. and M. A. Bethany.	E. E.	Bethany, W. Va.

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* Pursuing a special course.

UNDERGRADUATE STUDENTS.

A

Name.	*Course.*	*Address.*
Albin, Carl	E. E.	Columbus.
Alford, Arthur Milton	M. E.	Windham.
Ames, Holiday	C. E.	Ashland.
Archer, Carl Hunter	E. E.	Columbus.
Armstrong, Hugh Cook	E. E.	Clintonville.
Arnold, Charles H.	M. E.	New London.

B

Bahrke, Charles Frederick	I. A., S.	Columbus.
Bailey, Ervin George	E. E.	Damascus.
Bailey, Edward Harding	*M. E.	Damascus.
Bailey, Purdy Sanford	C. E.	Warren.
Baker, Charles Carroll	E. E.	St. Paris.
Balz, Ernest	C. E.	Columbus.
Balz, Louis Christian Fred	C. E.	Columbus.
Barker, Russel David	M. E.	Brooklyn, N. Y.
Barlow, Moses Henry	C. E.	Columbus.
Barringer, John Martin	Chem	Washington, D. C.
Barringer. Lawrence Eugene	Cer	Washington, D. C.
Barry, William John	C. E.	New Straitsville.
Battenfield, John Milton	E. E.	Delaware.
Baughman, Norman	E. E.	Roseville.
Baumann, John Carl Bernhardt	*Mining, S.	Gütersloh, Germ.
Bauroth, Walter John	M. E.	Springfield.
Beard, Frank Andrew	I. A.	Jacksontown.
Bedwell, Charles Francis	E. E.	Columbus.
Benbow, James D.	I. A., S.	Milo.
Berndroth, Geary Martin	M. E.	Geneva.
Berry, Charles Watson	E. E.	Columbus.
Besse, Thomas Samuel	E. E.	Pataskala.
Bigelow, Clarence C.	E. M.	Findlay.
Billingsley, Robert Wallace	M. E.	Lisbon.
Bleininger. Albert Victor	Chem	Columbus.
Boehme, Adolph Joe	M. E.	Youngstown.
Bomesberger, Walter Nelson	E. E.	Columbiana.
Boothman, Dale Maxwell	M. E.	Bryan.
Bostwick, Oliver Newton	C. E.	Mt. Sterling.
Bott, George Robert	M. E.	Columbus.
Bowden, Harry William	C. E.	Minerva.
Boynton, Henry Percy	E. M.	Elyria.

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* Pursuing a special course.

Name.	*Course.*	*Address.*
Bramble, Bennett Glenn	Chem	Bellefontaine.
Brannan, Thomas Hayes	C. E.	Marysville.
Brashear, Edward Rosemond	E. E.	Columbus.
Bridinger, Leon A.	E. M.	Tiffin.
Britton, William Miller	E. E.	Columbus.
Britton, Lloyd C.	C. E.	Williamsburg.
Brooks, Herbert Barton	E. E.	Piqua.
Buchenberg, Alvin Ernest	E. E.	Holgate.
Burch, Orrin	E. E.	Columbus.
Buydden, Wade Jennings, Jr.	E. M.	Dayton.
C		
Cameron, James L.	Arch	Malvern.
Cameron, Harry Ezra	C. E.	Lisbon.
Cameron, Gaylor Malcomb	E. E.	Jeromeville.
Campbell, Willis Elmer	Chem	Fostoria.
Campbell, Rollo Wilbur	C. E.	Fostoria.
Cannan, William	*Cer	Plymouth.
Carmichael, Robert	M. E.	Columbus.
Carr, William Brewster	E. E.	Yellow Springs.
Cartzdafner, Roy Edwin	M. E.	London.
Caskey, George Alexander	M. E.	Columbus.
Cavanaugh, Andrew Francis	M. E.	Dayton.
Cavin, Frank Thomas	E. E.	Spencer.
Chaffin, Wendel Wilson	C. E.	Dayton.
Chamberlain, John Ross	C. E.	Tiffin.
Chandler, Homer Payne	E. E.	Columbus.
Chandler, William H.	C. E.	Bellefontaine.
Chenoweth, Howard	*E. E.	Range.
Childs, Harry Jesse	C. E.	Troy.
Chubb, Joseph Horace	C. E.	Columbus.
Clarke, James Ulrick	E. E.	Lancaster.
Colgan, Frank J.	Cer., S.	Columbus.
Conrad, Vern Louis	C. E.	Columbus.
Cook, Spencer Nye	E. M.	Chillicothe.
Cooke, Royal Alstan	E. E.	Wyoming.
Cooley, James Riddile	E. E.	Nelsonville.
Cooper, Ralph McClelland	I. A., S.	Struthers.
Copland, James Samuel, Jr.	*M. E.	Dresden.
Cosley, Harvey Harter	C. E.	Troy.
Crabill, Pearl P.	*M. E.	Springfield.
Crable, Arthur	C. E.	Columbus.
Crable, George	E. M.	Columbus.
Creed, Frank Roy	Mining S.	Struthers.

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* Pursuing a special course.

Name.	*Course.*	*Address.*
Cridland, Harry Clifford	E. E.	Dayton.
Crooks, Thomas Elliott	E. E.	Van Wert.
Cryder, Howard Michael	Arch	Chillicothe.
Cryder, Ross Warner	E. E.	London.
D		
Damon, Owen H.	C. E.	Hinckley.
Dann, Walter M.	E. E.	Columbus.
Darrah, John Francy	E. E.	Toronto.
Davison, Holmes Bergen	Cer. S.	South River, N. J.
Day, Stanley, Frank	E. E.	Columbus.
Denmead, Edward Graham	M. E.	Columbus.
Denny, Charles Wampler	E. E.	Middletown.
DeWolf, Roger Dennison	E. E.	Madison, Ga.
Dick, Owen Quinton	I. A. S.	Marshall.
Dickenson, Morris L.	*I. A.	Columbus.
Diehl, Joseph A.	C. E.	Defiance.
Dierdorff, Percy Cyrus	M. E.	Columbus.
Dill, Raymond	E. E.	Columbus.
Doty, Charles Wilgerson	E. M.	Hanging Rock.
Drummond, William George	M. E.	Cleveland.
Dunlop, Robert Rowse	E. E.	Columbus.
Dupuy, Benjamin Francis	C. E.	Ironton.
E		
Ecker, Harrison Grant	E. E.	Columbus.
Edgerly, Raymond John	C. E.	Pataskala.
Elliott, Emmett Foster	Arch	Chester Hill.
Elsner, Richard E.	C. E.	Newark.
Emswiler, John Edwin	E. E.	Morgan Center.
Erdmann, William	I. A.	Chillicothe.
Escobar, Raphael	*Mining, S.	Puerto Principe, Cuba.
Espy, Frank	*E. E.	Kenton.
Euchenhofer, Albert John	E. E.	Dayton.
Evans, Charles Hopkins	Mining, S.	Evanston.
Evans, William Ruthrauff	M. E.	Salem, Va.
Eysenbach, Louis, Jr.	Ceramics	Delphos.
F		
Faulkner, Eldridge Rhodes	E. M.	Tippecanoe City.
Faulkner, Samuel Starrett	E. E.	Troy.
Fay, Sherman	M. E.	Wyoming.
Fickes, Walter M.	Ceramics	Steubenville.

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* Pursuing a special course.

Name.	*Course.*	*Address.*
Fleming, Joseph Hamilton	C. E.	Olentangy.
Follett, George Alfred	C. E.	Columbus.
Foster, George C.	E. M.	Schooley.
Foster, Vause	E. M.	Higby.
Fox. Lewis	C. E.	Payne.
Frame, Rollo St. Clair	C. E.	Washington C. H.
Frankenberg, George T.	M. E.	Columbus.
Frechtling, Arthur George	M. E.	Hamilton.
Freer, Will Davis	Cer	Cortland.
Friedland, Francis William	M. E.	Coalton.
Frost, George Winfield	M. E.	Columbus.
Fulton, James Stewart	M. E.	Steubenville.
Funk, Leo William	M. E.	Chester Hill.

G

Gates, Ellis Day	Cer., S.	Hinsdale, Ill.
Geren, Arthur G.	Mining, S.	Columbus.
Gilchrist, Edward Luce	E. E.	Ashtabula.
Gleichauf, Frank S.	Arch	Newark.
Goodell, Frank Herbert	Chem	Columbus.
Gould, William Stewart	M. E.	Wyoming.
Gray, Thomas M.	M. E.	Pittsburgh, Pa
Green, Homer Stewart	E. E.	Raymond.
Grindel, Charles Stanton	E. E.	Jacksontown.

H

Hager, LeRoy William	C. E.	Piqua.
Hall, Robert Gilbert	E. M.	Dayton.
Halsema, Eusebius J.	C. E.	New Bremen.
Halverstadt, Herbert	Cer	Columbiana.
Hamilton, Ross Elroy	C. E.	Keene.
Hammond, John Miller	C. E.	Columbus.
Hance, Harry Thomas	Chem	Columbus.
Hapgood, Eugene Palmer	Chem	Sabina.
Hardy, Paul	E. M.	Columbus.
Harkins, Robert Rusk	M. E.	Columbus.
Harmar, Frederick Sturgis	Mining S.	Columbus.
Harrop, Carl B.	E. M.	Columbus.
Harvey, Clarke Kenerly	C. E.	Brownsville.
Hatton, Frederic George	Arch	Columbus.
Hayman, Will Clayton	E. E.	Holgate.
Hayes, Charles Bradford	E. E.	Hilliards.
Hedges, Benson Rice	M. E.	Columbus.
Helvey, George Stanley	M. E.	Hamilton.

Name.	*Course.*	*Address.*
Herrick, Hobert C.	Chem	Wellington.
Hershey, Herbert Clover	I. A.	Columbus.
Hill, Harry Earl	C. E.	Richwood.
Hill, Cortland Latimer	C. E.	Berlin Heights.
Hirst, Harry	E. M.	Midvale.
Hitch, James Frank	C. E.	Batavia.
Holbrook, George Frederic	E. M.	Bucyrus.
Holoway, Thurman Welferd	E. E.	Zanesville.
Horn, Charles Curtis	E. E.	Pipesville.
Hoster, Herman A.	M. E.	Columbus.
Howard, Oscar David	Arch	Circleville.
Huddleson, Frank	*E. M.	Columbus.
Hulbert, William Rowsell	M. E.	New York, N. Y.
Hull, Walter Austin	Cer	Orangeville.
Hummel, Edmund Ray	E. E.	Carroll.
Hunt, Jay Horatio	Mining, S.	Columbus.
Hunter, James Williamson	C. E.	Zanesville.
Hunter, Madone Carrington	E. E.	Norwich.
Hylton, Gratwoods Walter	*M. E.	Springfield.
J		
Jackson, Charles Edwin	Cer., S.	Wheeling, W. Va.
Jackson, Elmer Collins	C. E.	Columbus.
James, Frank Richard	E. M.	Columbus.
Johnson, Earl S.	E. E.	Plants.
Johnson, Walter A.	M. E.	Columbus.
Johnston, Edward G.	M. E.	Bangor, Mich.
Jones, Howard Martin	E. E.	Marysville.
Jones, James Albert	C. E.	New Straitsville.
Judson, Walter Raymond	E. E.	Dayton.
K		
Kanmacher, Samuel Houston	E. E.	Columbus.
Keating, Harvey Thomas	Chem	Columbus.
Keim, Herbert Edward	C. E.	Cleveland.
Keller, Daniel Casteel	E. E.	Washington C. H.
Keller, William	E. E.	Washington C. H.
Kern, William Frederick	Chem	Bellaire.
Kettering, Charles Franklin	E. E.	Loudonville.
Kettler, Frank Christian	C. E.	New Bremen.
Kidder, Leonard	C. E.	Woodstock.
Killinger, Claud H.	C. E.	Toledo.
Kimmel, Fred Bernham	E. E.	Van Wert.
King, Francis Emmet	Mining, S.	Leisenring, Pa.

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* Pursuing a special course.

Name.	*Course.*	*Address.*
King, Herbert Sumner	C. E.	Medina.
Kinnear, Harry Baldwin	Chem	Mt. Sterling.
Kinneson, Ernest Eugene	C. E.	Jackson.
Kirker, Gaylord B.	Mining, S.	Catlettsburg, Ky.
Kittle, James Monroe	M. E.	Columbus.
Klie, Walter	M. E.	Columbus.
Knieling, Charles August	E. E.	Willoughby.
Knies, Daniel	E. E.	Columbus.
Knight, William Abner	M. E.	Columbus.
Knoderer, Homer Guy	E. E.	Columbus.
Knox, Frank S.	E. M.	Columbus.
Krumm, Thomas Zettler	C. E.	Columbus.
Kunkle, Fred Raymond	E. E.	Bryan.

L

Laiblin, Garfield	M. E.	Canton.
Lamb, Whitney Earl	E. E.	Commercial Point.
Lampert, John Martin	M. E.	Xenia.
Lanning, Adrian Roy	C. E.	Dennison.
Lee, Corlis Edgar	E. E.	Pugh Postoffice.
Leinbaugh, George Gurden	M. E.	Bellevue.
Lesh, John Howard	M. E.	Louisville.
Lied, Ernst Mitchell	E. E.	Columbus.
Linville, Clarence Philander	Chem	Urbana.
Linxweiler, Otto	M. E.	Dayton.
Lloyd, Donald K.	Mining, S.	Columbus.
Lockwood, Howard Thomas	C. E.	Batavia.
Loewensohn, David	C. E.	Urbana.
Long, George Garfield	E. M.	Tippecanoe City.
Luse, Herbert James	M. E.	Columbus.
Lyon, Arthur Hollingshead	M. E.	Wauseon.

M

Marckworth, Otto Stanley	*Chem	Cincinnati.
Marietta, Harry Riefsnider	E. E.	Dayton.
Marriott, John Minges	Arch	Delaware.
Marshall, Charles Howard	M. E.	Fair Haven.
Marshall, Willard Beverly	E. E.	Piqua.
Martin, John D., Jr.	M. E.	New Straitsville.
Mason, John T.	*Chem	Columbus.
Maxwell, Howard McGee	E. E.	Columbus.
Melick, Cyrus Alan	C. E.	Columbus.
Melick, Neil Albert	C. E.	Columbus.

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* Pursuing a special course.

Name.	*Course.*	*Address.*
Mercer, Robert Wood	E. M.	Chester Hill.
Miller, Albert Sanford	E. M.	Tiffin.
Miller, Charles Emmitt	Arch	Spencer.
Miller, Ralph Charles	C. E.	Zanesville.
Minor, Wells Hammond	E. M.	Akron.
Moist, Harvey Clinton	E. E.	Kinsey.
Monserrat, Charles R.	M. E.	Columbus.
Mooney, George Lewis	E. E.	Woodsfield.
Mooney, William Joseph	C. E.	Cleveland.
Morlan, Wilbert	*M. E.	Rogers.
Morris, Robert Hamilton	E. M.	Columbus.
Morris, Samuel	E. E.	Bloomingburg.
Morris, Willard Bernard	M. E.	Columbus.
Morris, William Blaine	M. E.	Massillon.
Morrison, Franklin Houston	Cer., S.	Denver, Col.
Murphy, Joseph Lincoln	C. E.	McArthur.
Myers, Albert B.	E. M.	Columbus.
Myers, Fred	C. E.	Louisville.
McComb, Hoyts Sherman	E. E.	Columbus.
McEowen, Hugh Elsworth	C. E.	Greenville.
McFarland, Horace M.	E. M.	Columbus.
McIntosh, Roscoe Everitt	E. E.	Ravenna.
McKeon, Robert Dale	C. E.	Arcanum.
McKinlay, William Shields	E. E.	Denver, Col.
McMullin, Roy	E. E.	Columbus.
McOwen, Thomas	C. E.	Ovid.
McWhinney, Harry Ozias	E. E.	Lewisburg.

N

Nauss, Ralph Welty	Chem	Greenville.
Needham, Harry Smithson	M. E.	Columbus.
Nevin, Lurton Kumler	Cer., S.	Dayton.
Nicholson, Charles Marion	E. E.	Columbus.
Nidy, Herbert C.	E. E.	Greentown.
Nobles, Edwin Earl	*C. E.	Flint, Mich.
Nold, John H.	E. M.	Columbiana.
Nye, Ralph D.	E. E.	Zanesville.

O

Ogden, Ellsworth	M. E.	Columbus.
Ohliger, Clyde C.	C. E.	Wellsville.
Osborn, Liphe Andrews	M. E.	Columbus.
O'Shaughnessy, Joseph	I. A. S.	Columbus.

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* Pursuing a special course.

P

Name.	*Course.*	*Address.*
Panter, Thomas Alfred	E. E	NiagaraFalls, N.Y.
Parkin, William Z	M. E	Columbus.
Parrett, Benjamin Creamer	Chem	Washington C. H.
Patton, William Arthur	M. E	Circleville.
Peck, Alfred Steven	Mining, S	Cleveland.
Perks, George Wheldon	M. E	Springfield.
Peterson, John William	Arch	Port Clinton.
Pleukharp, Erwin Hiram	I. A. S	Columbus.
Post, Malcolm Phelps	Cer	St. Louis, Mo.
Poto, Frank B	Chem	Alliance.
Potts, Royal Warren	*C. E	Columbus.
Pratt, Fred Kellogg	C. E	New Philadelphia.
Price, Fred Raymond	E. E	Columbus.

R

Reed, Nathaniel Garfield	M. E	Youngstown.
Reel, Walter C	C. E	Columbus.
Rennard, John Hiram	Mining, S	Wheeling, W. Va.
Riebel, Leroy Clemens	Arch	Columbus.
Rightmire, Robert Elwood	M. E	Wheelersburg.
Ritchie, George Alexander	C. E	Hudson.
Robinson, Robert Thane	E. E	Bryan.
Rogers, Rutherford Hayes	E. E	Columbus.
Romick, Howard Samuel	M. E	Hilliards.
Ross, Calvin Burt	E. E	Urbana.
Ross, Edward McKinstry	M. E	Jerseyville.
Roth, George Lewis	E. E	Port Clinton.
Roudebush, Howard John	E. E	Owensville.
Rupert, Jesse Solomon	E. E	New Waterford.
Ryland, Paul Dillen	C. E	Columbus.

S

Sanderson, Clarence Herbert	E. E	Logan.
Sanderson, Ray Rochester	E. M	Washington C. H.
Sayers, Delbert Bancroft	E. M	Marits.
Schlafly, Raydeon Karl	C. E	Mt. Eaton.
Schoenlaub, Thomas Jacob	C. E	Marion.
Schott, Alvin Christian	Chem	Massillon.
Schreiber, George Ernest	E. E	Ironton.
Schubert, Charles Wesley	C. E	Columbus.
Schwab, Frank Wilbert	Chem	New Philadelphia.

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* Pursuing a special course.

Name.	*Course.*	*Address.*
Scott, Cyrus Ellison	E. M.	Columbus.
Scott, James Blaine	E. E.	Batavia.
Senter, Herbert Pike	C. E.	Columbus.
Sharp, John McDowell	C. E.	Columbus.
Shaw, Lucian	C. E.	West Lafayette.
Shepherd, Charles William	C. E.	Huron.
Sherman, John K.	C. E.	Columbus.
Sherwood, Frank Porter	*E. E.	Ashtabula.
Shumate, Frank Douglass	M. E.	Urbana.
Siddall, John William	Mining, S.	Streator, Ill.
Sigrist, Charles Ferdinand	C. E.	Congress.
Simpson, Henry Jerome	C. E.	Worthington.
Singer, Lewis Parmlee	E. E.	Lewisburg.
Sinks, George Theodore	M. E.	Youngstown.
Smith, Harry Ford	M. E.	Lexington.
Smith, Roy Brooke	M. E.	Columbus.
Sosman, Robert Browning	Chem	Chillicothe.
Sowers, Emory Blose	I. A.	Westville.
Spangler, Thomas McClellan	*C. E.	Pleasantville.
Sproat, Amasa Delano	E. M.	Chillicothe.
Starbuck, John Clancy	I. A. S.	Somerton.
Sterling, James Gilman	M. E.	Springfield.
Stocker, James Arthur	C. E.	Gnadenhutten.
Stone, Thomas Wade	M. E.	New Bremen.
Stout, Wilber	Cer. S.	Sciotoville.
Strong, Harry Miller	*Mining, S.	Wilkesville.
Strong, Jonathan Edgar	M. E.	Columbus.
Stull, Raymond Thomas	Cer	Elkland, Pa.

T

Talbot, Edgar Carl	E. E.	Columbus.
Tanner, Edward Wood	M. E.	Zanesville.
Taylor, William Oliver	E. E.	Urbana.
Templin, John Richard	E. E.	Salem.
Thomas, Alfred Redman	Mining, S.	Glouster.
Thomas, David A. P.	Arch	Columbus.
Thomas, Edward	Chem	Navarre.
Thornton Nyman	M. E.	Wyoming.
Trish, George	Mining, S.	Nevada.
Tubbs, Alfred Stowe	Mining, S.	Tubbsville.
Tudor, Glenn E.	C. E.	Chicago.
Tyler, John Sherrerd	M. E.	Dayton.

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* Pursuing a special course.

Name.	Course.	Address.
V		
Van Dyke, Clifford Steel	E. E.	Ansonia.
Van Schoyck, Ray	M. E.	Hilliards.
Van Tine, Charles Hovey	M. E.	Tiffin.
Vosskuehler, Joseph Henry	M. E.	Dayton.
W		
Waddell, Starling	E. E.	Columbus.
Walker, Walter Hamilton	E. E.	West Canaan.
Walsh, George E.	M. E.	Columbus.
Ward, Samuel Edwin	M. E.	Green Spring.
Ward, Vernon C., Jr.	M. E.	Columbus.
Warnock, David Ross	E. E.	Urbana.
Webber, Frank Merrill	E. E.	West Richfield.
Weber, Frederick Clarence	Chem	Evanston.
Weidman, Charles Albert	E. E.	Navarre.
Weiss, William Winfred	C. E.	Canal Dover.
Wellbaum, Arvy E.	M. E.	Brookville.
Wells, Ralph P.	M. E.	Lisbon.
Whetsel, Emerson Jay	C. E.	Jackson.
White, Frederick Lewis	M. E.	Gambier.
Wilcox, Carl Clifford	M. E.	Columbus.
Wildermuth, Troy Dreslan	M. E.	Columbus.
Williams, Harry Ernest	M. E.	Harlem.
Williams, Howard Insco	C. E.	Dayton.
Williamson, Homer Davison	Chem	Monroe.
Wilson, James Sommerville	M. E.	Columbus.
Winger, Stanley DuBoise	M. E.	Springfield.
Wittich, Manuel	Cer., S.	Mt. Sterling.
Wolf, Richard Ludwig	Cer., S.	Detroit, Mich.
Wright, John	Cer., S.	Antrim, Pa.
Wright, Otis H.	E. E.	Worthington.
Wyer, Samuel S.	M. E.	Barberton.
Y		
Yost, Benjamin Franklin	*Mining, S.	Columbus.
Yost, Lloyd	M. E.	Somerset.
Youmans, W. Raymond	E. E.	Pataskala.
Z		
Zbinden, Hermann Christian	C. E.	Toledo.
Zeller, Ralph	E. M.	Ottawa.
Zwerner, Fred George	E. E.	Columbus.

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* Pursuing a special course.

GRADUATES

Civil Engineering (C. E.)	79
Mechanical Engineering (M. E.)	48
Mining Engineering (E. M.)	42
Electrical Engineering (M. E. in E. E.)	89
Chemistry (B. Sc. in Chemistry)	1
Industrial Arts (B. Sc. in Ind. Arts)	2
Total	261

DIRECTORY OF GRADUATES.

The faculty of the College of Engineering are anxious to place a copy of each annual catalogue in the hands of their graduates. They will esteem it a favor if any alumnus who changes his residence will notify the secretary of the College of his new address and occupation. They will also be grateful for any information from any source, that may assist in making or keeping the Directory of the Alumni complete and correct.

A

Ackerman, Eli Osborn, 1884, C. E. Station "B," Columbus, Ohio.	Columbus Street Railway Company.
Ackerman, Fremont, 1883, C. E. Los Angeles, California.	Civil Engineer.
Aldrich, Edgar S., 1897, E. E. Waynetown, Indiana.	Proprietor and Manager, Electric Light Plant.
Alexander, Charles P., 1896, E. E. Canton, Ohio.	District Manager, Northwestern Mutual Life Insurance Company.
Alexander, St. Clair, 1893, E. E. Bridgeport.	
Alsdorf Frederick C., 1892, E. M. Central City, Colorado.	Superintendent, Mt. Wilson Gold & Silver Mining Company.
Alsdorf, Percy Reed, 1896, E. M. Central City, Colorado.	Standard Assay Office.
Arnold, Edwin Ebert, 1898, M. E. Pittsburgh, Pennsylvania.	Westinghouse Machine Company.
Atkinson, Warren, 1899, M. E. No. 294 Clinton St., Brooklyn, N.Y.	Tester of steam pumping engines at the Brooklyn Works of H. R. Worthington.
Auld, James A., 1897, E. E. No. 76 East Gay St., Columbus, O.	With D. S. Auld.

B

Barcus, Miner, 1897, E. E. No. 211 Liberty St., Schenectady, N. Y.	With General Electric Company.
Barnaby, Charles L., 1898, C. E. Cincinnati, Ohio.	Assistont on Engineer Corps, Cincinnati Division, P., C., C. & St. L. Ry.

Barrows, Harry H., 1898, C. E. Lexington, Ky.	Resident Engineer Cinti. Southwestern Railway.
Bartholomew, Clyde S., 1896, C. E. El Paso, Texas.	Civil Engineer.
Beach, David Price, 1895, C. E. Wellsville, Ohio.	Assistant, Engineer Corps, Pennsylvania R. R. Company.
Beck, Arthur Andrew, 1893, C. E. Columbus, Ohio.	Deputy County Surveyor.
Belden, Sanford Bonner, 1895, E. M. Pittsburgh, Pa.	Manager Pittsburg Office Jeffrey Manufacturing Company.
Biebel, Herman M., 1896, E. E. Chicago, Illinois.	Engineering Department, Western Electric Company.
Bischoff, John Wallace, 1899, E. M. Thomas, West Virginia.	Assistant Engineer, Davis Coal & Coke Company.
Bissing, William, 1893, E. E. Baltimore, Maryland.	Examiner, U. S. Patent Office.
Blackburn, Frank H., E. E. Fostoria, Ohio.	Electric Engineer, Fostoria Incandescent Lamp Company.
Bloom, J. George, 1889, C. E. Chillicothe, Ohio.	Division Engineer, Ohio Division B. & O. S. W. R. R.
Bower, Jerome G., 1897, M. E. No. 295 North High St., Columbus, Ohio.	
Bradford, Joseph Nelson, 1883, M. E. Columbus, Ohio.	Professor, Drawing, Ohio State University.
Brophy, John Francis, 1899, E. M. Sun, Fayette Co., West Virginia.	Mining Engineer and Mine Boss, Sun Coal & Coke Company.
Brown, Fredrick W., 1888, E. M. Florence, Colorado.	Superintendent of Colorado Portland Cement Company.
Brown, Newton H., 1893. E. E. Newark, Delaware.	Professor Electrical Engineering, Delaware College.
Brumley, David Joseph, 1895, C. E. Louisville, Kentucky.	Assistant Engineer, Louisville & Nashville R. R.

BRUNING, HENRY D., 1896, C. E.. Pittsburgh, Pennsylvania.	Assistant on Engineer Corps, P., C., C. & St. L. R. R.
BUCKMAN, ARTHUR L., 1897, E. E. Toledo, Ohio.	Wire Chief, Central Union Telephone Company.
BURNS, JAMES FURGESON, 1891, C. E. Hopkinsville, Kentucky.	Assistant Engineer, Louisville & Nashville R. R.
BYGATE, HARRY G., 1891, M. E.... Homestead, Pennslyvania.	Draftsman, Homestead Steel Wks.

C

CALKINS, GEORGE HERBERT, 1895, E. E. Schenectady, N. Y.	Electrical Engineer, General Electric Company.
CAPRON, MARSHALL F., 1888, M. E. Cleveland, Ohio.	
CARR, HUGH STANLEY, 1896, E. E.. Lawrence, Kansas.	Assistant Professor Electrical Engineer.
CARROLL, PATRICK HENRY, 1894, E. M. Herrin, Illinois.	Superintendent, Big Muddy Coal & Iron Company.
CARSON, SAMUEL KING, 1895, E. E.. Manila, P. I.	Acting Assistant Surgeon, U. S. A.
CATLIN, HOMER CLARK, 1896, C. E.. New York.	Bridge Department, N. Y. C. R. R., Grand Central Station, N. Y.
CELLARIUS, FREDERICK J., 1888, C. E. Dayton, Ohio.	Assistant City Engineer.
CHAPPELL, WALTER EVANS, 1898, Care U. S. Despatch Agent, New York.	First Class Electrician U. S. S. "Chicago."
CILLEY, RAYMOND, 1896, M. E.... Brooklyn, N. Y.	U. S. Motor Vehicle Company.
CLARK, C. J., 1899, C. E.........	
CODDINGTON, EDWIN F., 1896, C. E., M. Sc., 1897 Mt. Hamilton, California.	Fellow in Astronomy, Lick Observatory, University of California.

Cole, George Nathan, 1891, E. E. Chicago, Illinois.	Contractor Architectural Iron.
Collins, Curtis, 1895, E. E. Baltimore, Maryland.	Salesman, General Electric Co.
Connell, William A., 1896, E. M. Kansas City, Missouri.	Secretary, Virginia Manganese Iron & Coal Company.
Conway, Hugh L., 1896, C. E. No. 2510 Hemlock St., Cincinnati, Ohio.	Assistant Engineer, Water Works.
Cope, Albert N., 1897, E. E. Columbus, Ohio.	Foreman, Columbus Street Railway Co.
Covell, Vernon Royce, 1895, C. E. Pittsburgh, Pennsylvania.	County Engineer's Assistant.
Cunningham, E. W., 1894, C. E. Pittsburgh, Pennsylvania.	Civil Engineer, Shoenberger Wrks., American Steel & Wire Co.
Curtis, Leigh Goodrich, 1899, C. E. Zanesville, Ohio.	Department M. of W., B. & O. R. R.

D

Damron, Carson W., 1897, M. E. Columbus, Ohio.	Assistant Engineer, The Jeffrey Manufacturing Company.
Davis, Charles William, 1894, E. M. Colorado Springs, Col., care J. McK. Ferriday & Co.	Mining.
Davis, Oscar Allen, 1897, E. E. Alliance, Ohio.	Draftsman, Morgan Engineering Company.
Deahl, Walter Smith, 1896, C. E. Pittsburgh, Pennsylvania.	Pittsburgh Bridge Company.
DeLoffre, Andre, 1896, E. E. Schenectady, N. Y.	Assistant, Engineering Department, General Electric Company.
Diemer, Hugo, 1896, E. E. Greenwood, North Carolina.	Professor, Mechanical Engineering, Agricultural and Mechanical College.
Donham, Maurice D., 1896, M. E. Warren, Pennsylvania.	Mechanical Engineer, Struthers, Wells & Company.

Dun, John J., 1883, E. M. Columbus, Ohio.	Consulting Engineer.
Dunlap, Thaddeus Cox, 1895, E. E. Chattanooga, Tennessee.	Consulting Engineer.
Dunnick, Edward, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.

E

Erskine, John G., 1886, E. M. Lowellsville.	Fire Brick Manufacturer.
Estep, Frank Leslie, 1898, E. E. Pittsburgh, Pennsylvania.	Draftsman, Shoenberger Works, American Steel & Wire Co.
Evans, Peter Platter, 1892, C. E. Boston, Massachusetts.	Contracting Engineer, King Bridge Company.
Eysenbach, Ernest, 1896, E. M. Columbus, Ohio.	General Superintendent, Columbus Gas Company.

F

Feicht, Russell S., 1890, E. E. Pittsburgh, Pennsylvania.	Westinghouse Electric & Manufacturing Company.
Fergus, Guy Carlton, 1898, E. E. Zanesville, Ohio.	Partner Zanesville Electric Co.
Fish, Fred Alan, 1898, E. E. Columbus, Ohio.	Ohio State University, Assistant, Electrical Engineering.
Floto, Julius, 1889, E. M. Chicago, Illinois.	Civil Engineer and Contractor, C. L. Strobel.
Flynn, Benjamin H., 1898, C. E. Columbus, Ohio.	Engineer, Ohio State Board of Health.
Flynn, Harry Franklin, 1892, C. E. Washington, D. C.	U. S. Coast and Geodetic Survey.
Foster, Frank M., 1894, E. E. Cincinnati, Ohio.	With John N. Poage, Water Columns and Valves.
Fowler, Harry R., 1894, E. E. Toledo, Ohio.	Electrical Engineering and Contracting.

Fox, John Herbert, 1897, M. E. Cleveland, Ohio.	Head Draftsman, The Brown Hoisting and Conveying Machine Company.
Frankenburg, John T., 1899, E. E. Columbus, Ohio.	
Fravel, George B., 1888, M. E. Cincinnati, Ohio.	Road Foreman of Engines, Pennsylvania Lines.
Frayer, Lee Ambrose, 1896, M. E. Columbus, Ohio.	Draftsman, Rarig Engineering Co.
Freeman, Stanton S., 1898, E. M. Parryville, Pennsylvania.	Superintendent, Carbon Iron & Steel Company.
French, Thomas Ewing, 1895, M. E. Columbus, Ohio.	Assistant Professor of Drawing, Ohio State University.

G

Gallen, William F., 1897, M. E. Columbus, Ohio.	Jeffrey Manufacturing Company.
Gamper, Herman, 1899, M. E. Easton, Pa.	Ingersoll-Sargeant Drill Co.
Garber, John Murray, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.
Gee, Eugene C., 1897, E. E. Wheeling, West Virginia.	Wire Chief, Bell Telephone Co.
Gehrkens, Edmard F., 1894, E. E. Schenectady, N. Y.	General Electric Company.
Given, James Byron, 1896, E. E. Chicago, Illinois.	Western Electric Company.
Goddard, Loring Hapgood, 1892, C. E. Manara, Ohio.	Farmer and Stockman.
Goodell, Ralph Spencer, 1892, C. E. Mt. Vernon, Ohio.	Principal Assistant Engineer, Mt. Vernon Bridge Works.
Graham, Emery Eugene, 1898, E. E. Alliance, Ohio.	Draftsman, Morgan Engineering Company.

Grate, Charles Artemus, 1898, Columbus, Ohio.	Fellow and Laboratory Assistant, Mechanical Engineering, Ohio State University.
Green, Jerome Joseph, 1893, E. E. . Notre Dame, Indiana.	Professor of Physics and Electrical Engineering.
Green, Joseph Farist, 1899, E. E. . Moline, Illinois.	Electrical Engineer, Moline Electric Elevator Company.
Gregory, Hiram D., 1880, E. M...... Covington, Kentucky.	Attorney-at-law.
Griffin, Marn H., 1897, E. E...... Xenia, Ohio.	Electrician, Soldiers' and Sailors' Orphan Home.
Groves, John Wesley, 1898, C. E. . Columbus, Ohio.	Assistant, Civil Engineering, Ohio State University.

H

Haas, F., 1895, C. E.; 1896, E. M. Middlesboro, Kentucky.	Chemist, Middlesboro Blast Furnaces of Virginia Iron, Coal & Coke Company.
Hale, Frederick James, 1898, M. E. Columbus, Ohio.	Fellow, Mechanical Engineering, Ohio State University.
Hall, Harry R., 1889, E. M........ Middlesboro, Kentucky.	Superintendent, Middlesboro Blast Furnaces of Virginia Iron, Coal & Coke Company.
Harrison, William H., 1885, C. E. Butte, Montana.	Assistant Engineer, Butte City Water Company.
Hartwell, Arthur, 1888, M. E.... Chicago, Illinois.	Manager, Chicago Office, Westinghouse Electric & Mfg. Co.
Hartwick, Louis M., 1897, M. E... Johnstown, Pennsylvania.	Draftsman in Steel Works.
Hassler, Robert Hanich, 1892, E. E. Indianapolis, Indiana.	Electrical Engineer, American Bicycle Co., Waverly Factory.
Hayward, George E., 1893, C. E.... New Philadelphia, Ohio.	Surveyor of Tuscarawas County, Ohio.
Hazlett, Robert Jr., 1887, C. E.... Wheeling, West Virginia.	Engineer for Ohio Company, West Virginia.

Hebble, Charles Roy, 1896, E. E. Xenia, Ohio.	Insurance Business.
Heller, Albert Henry, 1890, C. E. Youngstown, Ohio.	Chief Engineer, Youngstown Bridge Company.
Henderson, Adelbert A., 1898, C. E. Pittsburgh, Pennsylvania.	Transitman, County Engineer.
Henretta, Charles M., 1896, E. M. Cambridge, Ohio.	Mining Engineer, Jas. W. Ellsworth & Co., and The Morris & Guild Co.
Hertner, John Henry, 1899, E. E. Chicago, Illinois.	Testing Department, Western Electric Company.
Hewitt, Strafford R., 1898, E. E. Columbus, Ohio.	Constructing Engineer for Columbus Mine and Mill Supply Co.
Hine, Lucius A., 1888, E. M. Chicago, Illinois.	President and Treasurer, Hine-Watt Manufacturing Company.
Hipple, John Merton, 1898, E. E. Wilkinsburg, Pennsylvania.	Inspector, Westinghouse Electric & Manufacturing Company.
Hirsch, Gustav, 1897, E. E. Columbus, Ohio.	Engineer in charge of Construction, Columbus Citizens' Telephone Company.
Homan, Frank, 1895, C. E. Cannelton, West Virginia.	General Manager of the Raven Coal & Coke Company.
Howells, E. S., 1884, E. M. Massillon, Ohio.	Howells Mining Company.
Howells, Thomas J., 1897, E. M. Steubenville, Ohio.	Foreman Cupola Departm't, Mingo Works National Steel Company, Mingo Junction, Ohio.
Hunt, William F., 1887, M. E. St. Paul, Minn.	Attorney-at-law.
Huntington, Arthur, 1899, M. E. Turtle Creek, Pennsylvania.	Student, Westinghouse Electric Manufacturing Company.
Hyle, Charles A., 1896, E. E. Mt. Tamalpais, California.	U. S. Weather Bureau.

I

IRELAND, GUY L., 1895, M. E.	
IRVIN, CHADWICK H., 1897, M. E. .... Lima, Ohio.	Draftsman, The Solar Refining Co.

J

JENKINS, WILLIAM G., 1893, C. E. . Bellefontaine, Ohio.	District Agent, Interstate Savings Investment Company.
JENKINS, WILLIS H., 1894, C. E. .... Columbus, Ohio.	Transitman, P., C., C. & St. L. R. R.
JENNINGS, LEVI E., 1897, E. E. ..... Indianapolis, Ind.	Special Agent, Central Union Telephone Company.
JOHNSON, CHARLES W., 1896, E. E. . Norwood, Ohio.	Chief Draftsman, Bullock Electric Manufacturing Company.
JOHNSON, HERBERT L. R., 1892, E. E. Troy, Ohio.	Engineer and Treasurer of the Hobart Electric Manufacturing Co.
JOHNSTON, GEORGE E., 1892, C. E. . Louisville, Kentucky.	Civil Engineer, L. & N. R. R. Co.
JONES, ARTHUR JAMES, 1898, E. E. . Turtle Creek, Pennsylvania.	Student, Westinghouse Electric & Manufacturing Company.
JONES, ALEXANDER HOUSTON, 1895,	
JONES, PEARL N., 1892, E. E. ..... Pittsburgh, Pennsylvania.	Engineer and Salesman, Westinghouse Electric & Mfg. Co.
JONES, SMILIE, 1894, E. M. .... Prescott, A. T.	Superintendent, Empire Gold Mining & Milling Company.
JUDD, HORACE, 1897, M. E. .... Brooklyn, N. Y.	Instructor, Department Science and Technology, Pratt Institute.

K

KEFFER, FREDRICK, 1882, E. M. ..... Anaconda, British Columbia.	General Manager, The British Columbia Copper Co., Ltd.
KEMMLER, EDWARD A., 1888, C. E. . Columbus, Ohio.	Assistant City Engineer.

Kerr, Samuel Thompson, 1894, E. E. Martins Ferry, Ohio.	Superintendent, Municipal Electric Light Plant.
Kester, Fredrick Edward, 1895, E. E. Columbus, Ohio.	Assistant in Physics, Ohio State University.
Kiesewetter, Frank L., 1891, C. E. Columbus, Ohio.	Cashier, The Ohio National Bank.
Kline, Charles H., 1897, E. E. Dayton, Ohio.	Civil Engineer and Deputy County Surveyor.
Knecht, Arthur E., 1898, M. E. Akron, Ohio.	With the Stirling Company, Barberton, Ohio.
Krumm, Louis Ralh, 1898, E. E. Columbus, Ohio.	Ohio Central Union Telephone Co.
Kuhn, Vallie Howard, 1896, E. E. Etna, Ohio.	

L

Lamme, Benjamin G., 1888, M. E. Pittsburgh, Pennsylvania.	Engineer, Westinghouse Electrical & Manufacturing Company.
Lamme, Bertha A., 1893, E. E. Pittsburgh, Pennsylvania.	Westinghouse Electric & Mfg. Co.
Large, Joseph H., 1890, C. E. Whigville, Ohio.	
Lee, Robert M., 1897, M. E. Columbus, Ohio.	Mechanical Engineer.
Levering, Orpheus D., 1893, M. E. Winchester, Massachusetts.	The McKay Metallic Fastening Association.
Lincoln, Paul M., 1892, E. E. Niagara Falls, N. Y.	Electrical Engineer, Niagara Falls Power Company.
Lindo, William C., 1896, C. E. Port Antonia, Jamaica, W. I.	Civil Engineer.
Linebaugh, Jesse Joseph, 1899, E. E. Schenectady, N. Y.	Electrical Engineer, Testing Department, General Electric Co.

Logan, Lavallette L., 1896, E. M.. Scranton, Pennsylvania.	Professor Mine Surveying, International Correspondence Schools.
Lott, Charles Milford, 1895, E. E.. Paulding, Ohio.	Supt., Electric Light Plant.
Lovejoy, Ellis, 1885, E. M........ Union Furnace, Ohio.	Superintendent, Columbus Brick & Terra Cotta Company.

M

Mackey, Ure L., A. B., 1893, E. E.	
Manley, Rush Emmett, 1894, E. E.. Mt. Vernon, Ohio.	Manager, Telephone Exchange, Central Union Telephone Co.
Marquard, Frank F., 1896, C. E. Sharon, Pennsylvania.	Chemist, National Company.
Martin, George, 1897, E. E........ Massillon, Ohio.	Inspector, Central Union Telephone Company.
Martin, Percy, 1892, E. E......... Milan, Italy.	General Manager, Mediterranean Electric Company.
Marvin, Charles F., 1883, M. E.. Washington, D. C.	Professor Meteorology, U. S. Weather Bureau.
Masters, George Albert, 1886, C. E. 4558 Oakenwald Avenue, Chicago, Illinois.	Assistant Manager, Western Library Association.
Matson, William Edgar, 1896, E. E. Lynn, Massachusetts.	Production Department, General Electric Company.
McAllen, William J., 1894, C. E. Chicago, Illinois.	Civil Engineer, Structural Department, Illinois Steel Company.
McCarter, Robert D., Jr., 1895, E. E. Berlin, Germany.	With General Electric Company.
McCormick, John H., 1880, M. E.. Dayton, Ohio.	National Cash Register Company.
McCormick, William F., 1896, M.E. Columbus, Ohio.	

McGrew, John A., 1895, C. E..... Logansport, Indiana.	Assistant Engineer, M. of W. Pennsylvania Company.
McGuffey, Francis H., 1894, E. E.. New Lexington, Ohio.	Electrician, U. S. Telephone Co.
McIntire, Alfred Heber, 1898, E. E. Columbus, Ohio.	Assistant in Industrial Arts, Ohio State University.
McNarry, George B., Jr., 1896, E.E. Toledo, Ohio.	Traveling Salesman, T. Bissell & Co.
Menough, Arthur G., 1894, E. M.. Apartado 17, Zacatecas, Mexico.	Assayer and Chemist.
Mercer, Frank Emmett, 1896, E. E. Lima, Ohio.	
Mershon, Ralph D., 1890, E. E... New York City.	Electrical Engineer, Westinghouse Electric Manufacturing Co.
Miller, Frank Case, 1893, C. E.... Dwight, Illinois.	Supervisor, Chicago & Alton R. R., Dwight to Springfield.
Miller, Harry F., 1889, M. E...... South Bethlehem, Pennsylvania.	
Morris, Clyde Tucker, 1898, C. E.. Youngstown, Ohio.	Draftsman, Youngstown Bridge Company.
Morrison, Robert O., 1893, C. E.... New Castle, Pennsylvania.	Assistant on Engineers Corps, Erie & Ashtabula Division of Pennsylvania Lines West of Pittsburg.
Morton, George L., 1884, M. E...... Washington, D. C.	Principal Examiner, U. S. Patent Office.
Munn, Mortimer Adam, 1894, C. E. Cleveland, Ohio.	Division Engineer, Cleveland & Eastern Railway Co.
Myers, Ord, 1895, E. E............ New York City.	Inspector, Metropalitan Street Railway Company.
Myers, Roy V., 1893, C. E.......... Dayton, Tennessee.	Superintendent Mines, Dayton Coal & Iron Co., Ltd.

Myers, Uriah H., 1887, E. M...... Pittsburgh, Pennsylvania.	Myers, Shinkle & Co.

N

Nagel, William G., 1895, E. E.... Toledo, Ohio.	W. G. Nagel & Co., Electric Supplies.
Newton, Samuel Donald, 1895, C.E. Knoxville, Tennessee.	Maintenance of Way Department, Southern Railroad.
Nurian, Kerson, 1899, M. E....... Turtle Creek, Pennsylvania.	Westinghouse Electric & Manufacturing Co.

O

O'Brine, David, 1881, B. Sc., M. Sc., E. M., D. Sc., M. D.............. Urbana, Ohio.	Physician.
Orton, Edward Jr., 1884, E. M.... Columbus, Ohio.	Director of the Department of Clay-working and Ceramics, Ohio State University.

P

Pabodie, Robert Jewett, 1899, M. E. Watertown, N. Y.	Assistant General Foreman, Watertown Steam Engine Company.
Palmer, Walter K., 1893, M. E.... Lawrence, Kansas.	Associate Professor, Department Mechanical Engineering, University of Kansas.
Patch, Homer Austin, 1896, C. E.. Minneapolis, Minn.	Draftsman, Gillette-Herzog Manufacturing Company.
Payne, Halbert Edward, 1887, M. E. New York City.	Pres. American Typewriter Company.
Pearl, Allen Sexton, 1894, E. E.. Columbus, Ohio.	Ohio Representative of Central Electric Company, Chicago, Ill.
Pedlow, Edward B., 1893, C. E..... New Straitsville, Ohio.	General Superintendent, C. & H. C. & I. Co.
Pence, David Arrel, 1894, M. E... Lowellville.	
Peppel, Samuel Vernon, 1899, B.Sc. Madison, Wisconsin.	Chemist, Wisconsin Geological Survey.

Peters, William Lincoln, 1885, Riverside, California.	Merchant.
Peirce, John Mattison, 1895, E. E. South Charleston, Ohio.	
Pilcher, Hastings Moore, 1895, Athens, Ohio.	Telegraph Operator and Billing Clerk.
Pleukharp, Rev. Charles V., 1885, M. E. Lacanada, California.	
Polk, Walter C., 1895, C. E. Indianapolis, Indiana.	Assistant General Foreman, Central Union Telephone Company.
Postle, Herman R., 1894, C. E. Joplin, Missouri.	Civil Engineer.
Powell, Charles S., 1893, E. E. Cleveland, Ohio.	Manager Cleveland Office, Westinghouse Electric & Mfg. Co.

R

Rawson, Levi, 1899, C. E. Sisterville, West Virginia.	Engineer, Carter Oil Company.
Ray, Frank A., 1887, E. M. 137 King Ave., Columbus, Ohio.	Associate Professor of Mine Engineering, Ohio State University.
Ray, William M., 1893, C. E. Cleveland Ohio.	Assistant Engineer, C., L. & W. R. R. Co.
Raymond, Coles Abel, 1894, C. E. Wauseon, Ohio.	Bridge Draftsman.
Reed, Robert Browning, 1896, E. E. Zanesville, Ohio.	Electric Construction and Supply Business.
Reed, William Allen, 1897, E. M. Querida, Colorado.	Assayer and Surveyor, Bassick G. M. Co.
Reeves, Archibald C., 1887, C. E. Dayton, Ohio.	Assistant City Engineer.
Rice, Herbert A., 1897, C. E. Jackson, Ohio.	Assistant Principal High School.

Riddle, Howard Sterling, 1897, Akron, Ohio.	Engineer, The Diamond Rubber Company.
Roberts, Cyrus Swan, 1898, E. M. . San Luis Potosi, Mexico.	Chemist and Assayer.
Robinson, Erdis Geroska, 1893, C. E. Mexico.	Assistant Engineer, Engineering Department, Mexican Central Ry.
Rogers, James Bertrand, 1896, E. M. Steubenville, Ohio.	National Steel Co., Mingo Junction.
Root, Willis J., 1885, E. M........ Columbus, Ohio.	Chemist, National Steel Company, Columbus Works.
Rowlee, Henry A., 1897, M. E.... Columbus, Ohio.	The Rarig Eng. Co., Assistant Inspector, Ordnance, U. S. Army.
Ruhlen, Carl Marble, 1898, M. E. . Honolulu, Hawaiian Island.	Assistant in Construction Department, U. S. Army.

S

Schaub, Edward L. T., 1885, M. E. Columbus, Ohio.	Assistant Superintendent, Associated Charities.
Schaup, Charles E., 1897, E. M. . Phillippi, West Virginia.	Chief Engineer, Southern Coal & Transportation Company.
Scheibell, William O., 1888, E. M. Columbus, Ohio.	Secretary and General Manager, The American Art Tile Company.
Schreiber, John Martin, 1899, E. E. Cleveland, Ohio.	Cleveland Electric Street Railway.
Schroll, Otto, 1886, C. E.......... Wheeling, West Viriginia.	Engineer, M. of W., W. B. & T. Ry. Co.
Sedgwick, Edward C., 1895, E. E. . Columbus, Ohio.	Mechanical Draftsman, The Case Manufacturing Company.
Serva, Adam A., 1893, E. E........ Ft. Wayne, Indiana.	Assistant to Sales Manager, Fort Wayne Electric Works.
Sharp, Charles C., 1888, C. E...... Corning, Ohio.	General Superintendent, Sunday Creek Coal Company.

Sherman, Chris. E., 1894, C. E.. Columbus, Ohio.	Assistant Professor, Civil Engineering, Ohio State University.
Simonton, Mark, 1895, E. E........ Columbus, Ohio.	President, Electrical Supply & Construction Co.
Skinner, Charles E., 1890, M. E.. Pittsburgh, Pennsylvania.	Engineer, Electrical Engineering Department, Westinghouse Electric & Manufacturing Company.
Smith, David William, 1899, C. E. Columbus, Ohio.	Engineer, Hocking Valley Ry. Co.
Snider, C. M., 1897, B. Sc. (I. A.).	
Sperr, Frederick W., 1883, E. M... Houghton, Michigan.	Professor of Civil and Mining Engineering, Michigan College of Mines.
Sprague, Clarence M., 1899, C. E.. Columbus, Ohio.	Assistant on Engineering Corps, P., C., C. & St. L. Ry., Indianapolis Division.
Spurrier, John R., 1896, E. E..... Wilkinsburg, Pennsylvania.	Draftsman, Westinghouse Electric & Manufacturing Company.
Staley, Marcellus, 1899, E. E..... U. S. Transport Meade.	Chief Electrician.
Starbuck, Daniel Carl, 1899, E. E. Care U. S. Despatch Agent, New York.	U. S. S. Chicago.
Stewart, Harford T., 1896, E. E... Columbus, Ohio.	Agent, General Electric Company.
Stewart, Lee Raymond, 1896, C. E. Philadelphia, Pennsylvania.	Draftsman, New York Ship Building Company.
Stinebaugh, Isaac Long, 1892, C. E. Port Clinton, Ohio.	Deputy to the County Surveyor.
Stone, Carleton Elijah, 1899, C. E. Gallipolis, Ohio.	Civil Engineer.
Storer, Norman Wilson, 1891, E. E. Pittsburgh, Pennsylvania.	Westinghouse Electrical & Manufacturing Company.

STORER, SIMON B., 1893, E. E.......	Engineer, Westinghouse Electric & Manufacturing Company.
STULL, EMMETT WILLETT, 1894, E. E. Johnstown, Pennsylvania.	Engineer, Motor Department, Lorain Steel Company.
STUMP, JOHN WILLIAM, 1895, C. E.. Circleville, Ohio.	County Surveyor.

T

TAYLOR, ARTHUR W., 1893, E. M.... Cleveland, Ohio.	Chemist, Otis Steel Company, Ltd.
THOMAS, JAMES O., 1897, C. E...... Columbus, Ohio.	Assistant Wire Chief, Central Union Telephone Company.
TOMLINSON, JAMES ROWE, 1892, C. E. Cleveland, Ohio.	Bridge Draftsman.
TOWNE, ROBERT S., 1879, B. SC., E. M. New York City.	President Mexican Northern Railway Company.
TUFTS, CHARLES HILL, 1899, E. M.. Cleveland, Ohio.	Assistant Chemist, Otis Steel Co. (Ltd.).
TURNER, ARTHUR M., 1893, E. E.... 281 Oak St., Chicago, Illinois.	

U

URBAN, HARRY M., 1898, C. E..... Pittsburgh, Pennsylvania.	Assistant, Engineer Corps, P., C., C. & St. L. R. R. Co.

V

VANDERVOORT, W. P., 1886, E. M.... Morrow, Ohio.	Superintendent of Schools.
VIETS, WILLIS B., 1886, E. M....... Parryville, Carbon Co., Pa.	Chemist, Carbon Iron & Steel Co., Ltd.

W

WADSWORTH, F. L. OLCUTT, 1888, B. SC., E. M., M. E. Allegheny, Pennsylvania.	Director Allegheny Observatory.
WALKER, JAMES MADISON, 1896, C. E. Chicago Junction, Ohio.	Assistant Res. Engineer, B. & O. R. R. Co.

Watt, Sern P., 1886, M. E........ Chicago, Illinois.	Vice President and Mechanical Expert of Hine-Watt Mfg. Co.
Weick, C. W., 1898, B. Sc. (I. A.). New York.	Professor Manual Training, Teachers' College Columbia University, New York.
Welch, Clark J., 1888, C. E........ Pittsburgh, Pennsylvania.	Assistant Engineer, Keystone Bridge Works.
Welch, Oliver Bartlett, 1895, E. E. Dennison, Ohio.	General Manager, United Electric Company.
Wilcox, Alvah Newton, 1895, E. E.	
Wirthwein, Louis P., 1899, C. E... Columbus, Ohio.	
Wise, Albert Joseph, 1898, C. E.... Anderson, Indiana.	Assistant Engineer, Cleveland & Indianapolis Division, C., C., C. & St. L. R. R.
Wolf, Herman Howard, 1895, C. E. U. S. Steamer Galveston.	Lieutenant, U. S. Revenue Cutter Service.

Z

Zaumseil, Oscar C., 1887, C. E.... Webb City, Missouri.	Merchant.
Zurfluh, William N., 1894, E. E. Springfield, Ohio.	The Robbins & Myers Company.

List of Graduates from Other Colleges of the Ohio State University Who are now doing Engineering Work

BRADFORD, ERNEST, 1892, G. PH....	Analytical Chemist.
CONVERSE, HOWARD P., 1887, B. SC. Boston, Massachusetts.	Manager of the Boston Office, Cooper, Hewitt & Co., Steel and Iron Manufacturers.
EVANS, ERNEST, 1892, B. SC........ Mingo Junction, Ohio.	Chemist, Laughlin Junction Steel Company.
HOWALD, FERDINAND, 1878, B. SC.... Rush Run, Fayette Co., W. Va.	Manager Mining Operations.
HUMPHREY, J. SCOTT, 1879, B. SC.. Findlay, Ohio.	Civil Engineer.
JONES, JESSE LEE, 1890, B. A...... Philadelphia, Pennsylvania.	Chemist, William Cramp & Sons, Ship Builders.
KIRKER, HARRY L., 1899, B. SC...... Havre, France.	Electrical Engineer, Westinghouse Electric & Manufacturing Co.
KNOPF, GEORGE W., 1883, B. SC...... Pittsburgh, Pennsylvania.	Bridge Builder.
LOVEJOY, JESSE R., 1884, B. SC...... Schenectady, N. Y.	Manager, Lighting, Railway and Supply Department, General Electric Company.
MCDOWELL, JOHN A., 1882, B. SC.... Columbus, Ohio.	Chemist, Specialty Portland Cement Manufacture.
MIX, EDGAR W., B. SC.............. Paris, France.	Superintendent, Le Society des Etablissments.
MOYER, HENRY E., 1893, B. SC...... Youngstown, Ohio.	Chemist, Youngstown Steel Co.
NEWTON, HARRY S., 1889, B. SC..... Syracuse, New York.	General Manager and Chief Engineer, S. L. & B. R. R. Co.
PHELPS, CYRUS ALBA, 1892, B. SC.. Sombereto, Jacataccas, Mexico.	Sombereto Mining & Milling Co.

Ritchey, Joseph C., 1890, B. Sc.... Mingo Junction, Ohio.	Junction Iron & Steel Company.
Scott, Charles Felton, 1885, B. A. Pittsburgh, Pennsylvania.	Chief Electrician, Westinghouse Electrical & Manufacturing Co.
Short, Sidney H., 1880, B. Sc...... 110 Cannon St., London, E. C., England.	Electrical Inventor and Contractor.
Smith, Burton Griffin, 1895, G. Ph. Detroit, Michigan.	Chemist, Ray Chemical Company.
Somermier, Edward E.. 1898, G. Ph. Ohio State University.	Assistant in Metallurgy, Ohio State University.
Ward, John C., 1880, B. A......... Painesville, Ohio.	Engineer and Surveyor.
Wikoff, John Burkett, 1884, B. Ph. Cambridge, Ohio.	Assistant to General Manager, Cleveland & Marietta Railway Company.

Directory of Those Who have Completed Short Courses

CERAMICS

ADAMS, JOHN CARROLL, 1897 Lynchburg, West Virginia.	Timber Purchaser.
BERKEY, LESLIE REESE, 1899 Bolivar, Pennsylvania.	Reese, Hammond & Co., Fire Brick Makers.
BLEININGER, ALBERT VICTOR, 1897 Columbus, Ohio.	Laboratory Assistant, Department of Ceramics, Ohio State University.
BRADDOCK, EVERETT F., 1896 Richfield, Ohio.	
CAMPBELL, AUGUSTINE RAY, 1898 Tottenville, S. I., New York.	Chemist, Atlantic Terra Cotta Co.
GIESSEN, CARL, 1896 Canton, Ohio.	
GORTON, ELMER ELLSWORTH, 1896 West McHenry, Illinois.	Chemist, American Terra Cotta & Ceramic Company.
HENSEL, OTTO, 1897 Chicago Heights, Illinois.	Chemist, Ludowici Roofing Tile Co.
ITTNER, WARREN WAYNE, 1899 Belleville, Illinois.	Superintendent of the Anthony Ittner Brick Company Yards.
JONES, EDWARD F., 1896 St. Louis, Missouri.	Glazemaker, St. Louis Terra Cotta Company.
POST, MALCOLM PHELPS, 1899 St. Louis, Missouri.	Student in Four Year Course in Ceramics, Ohio State University.
PURDY, ROSS C., 1898 Zanesville, Ohio.	Assistant Superintendent, Mosaic Tile Company.
THOMAS, DAVID C., 1896 Wellsville, Ohio.	Ceramic Chemist, U. S. Pottery Company.
WOLFLEY, JOHN W., 1896 Anderson, Indiana.	Burner, Columbia Encaustic Tile Company.
WORCESTER, WOLSEY G., 1899 Cincinnati, Ohio.	With Cincinnati Roofing Tile Company.

MINING

Anderson, Arthur, 1898.
Shawnee, Ohio.

Blower, J. W, 1892.
Bunola, Pennsylvania.

Bohm, Oscar Herman, 1899.
Cleveland, Ohio.

Boyd, Arthur, 1893.
Thurman, West Virginia.

Brophy, John S., 1898.
Fortsburgh, Maryland.

Carroll, Patrick, 1891.
Houtzdale, Pennsylvania.

Dixon, C. F., 1890.
Phillipsburg, Pennsylvania.

Evans, John M., 1895.
Shawnee, Ohio.

Fyfe, John, 1891.
Houtzdale, Pennsylvania.

Gildroy, R. E., 1891.
Whatcheer, Pennsylvania.

Harrigan, Archer, 1899.
New Castle, Pennsylvania.

Harrigan, Patrick, 1893.
Jackson, Ohio.

Herron, J. S., 1893.,
Walkersville, Pennsylvania.

Jenkins, Jonathan, 1891.
Frotsburgh, Maryland.

Laviers, Henry, 1893.
Jackson, Ohio.

Lochrie, John, 1890.
Houtzdale, Pennsylvania.

McKey, R. F., 1894.
Coal Glenn, Pennsylvania.

Moss, James, 1891.
Byersville, Ohio.

Newton, E. A., 1893
Jeffries, Pennsylvania.

Nichols, J. L. D., 1895.

Oakes, C. H. Jr., 1892
Jackson Center, Pennsylvania.

Phillips, F. R., 1893.
Laonoconing, Maryland.

Quigley, John, 1893.
Westville, Pennsylvania.

Quigley, Robert, 1894.
Westville, Pennsylvania.

Quinn, John, 1891.
Houtzdale, Pennsylvania.

Ralston, William, 1896.
Newman, Ohio.

Rees, David, 1891.
Cleveland, Ohio.

Rees, Evan, 1895.
Jacksonville, Ohio.

Snedden, James, 1892.
Antrim, Pennsylvania.

Tetlow, W. A., 1892.
Washingtonville, Ohio.

Wright, John, 1892.
Antrim, Pennsylvania.

UNIVERSITY BULLETIN SERIES 5 — NO. 12

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

OHIO STATE UNIVERSITY

1901—1902

Entered at the Postoffice at Columbus, Ohio, as second-class matter

OHIO STATE UNIVERSITY

CATALOGUE

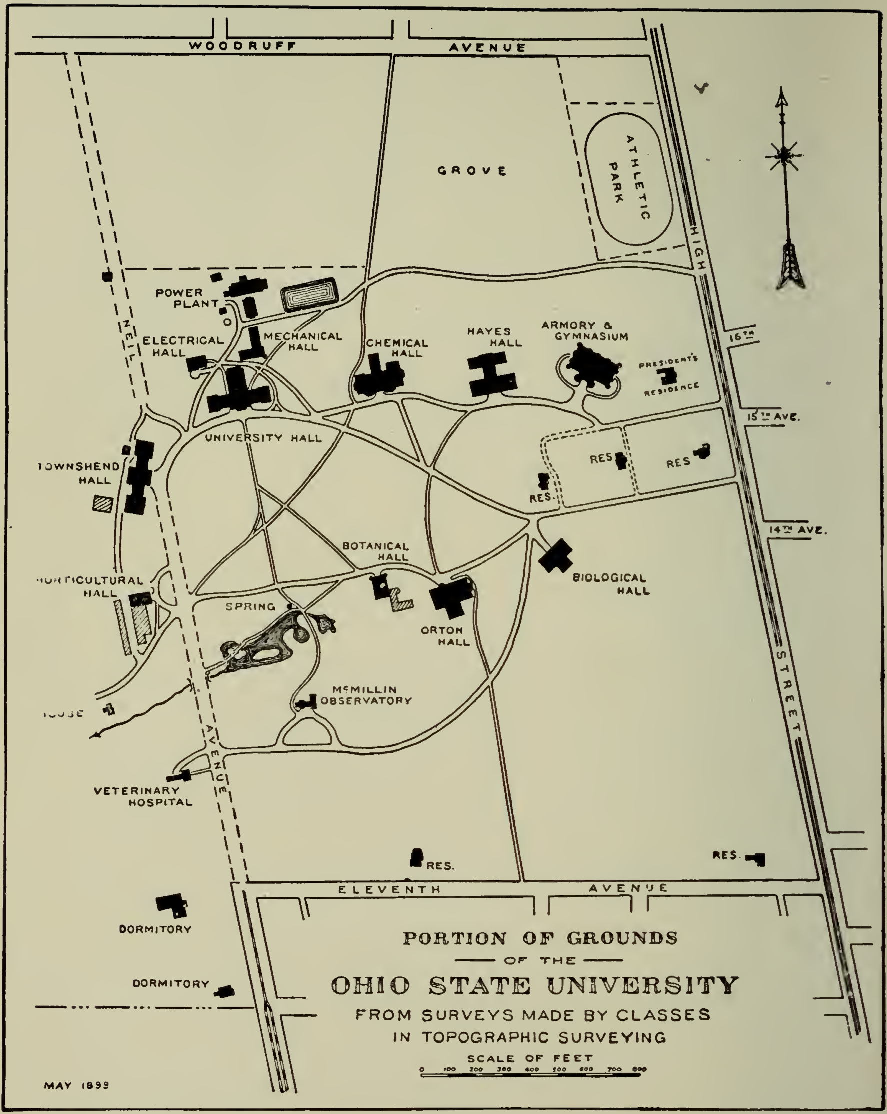
OF THE

COLLEGE OF ENGINEERING

COURSES OF INSTRUCTION
BUILDINGS
EQUIPMENT
FACULTY
ALUMNI
STUDENTS

1901—1902

COLUMBUS
PUBLISHED BY THE UNIVERSITY
APRIL, 1901



PORTION OF GROUNDS
OF THE
OHIO STATE UNIVERSITY
FROM SURVEYS MADE BY CLASSES
IN TOPOGRAPHIC SURVEYING

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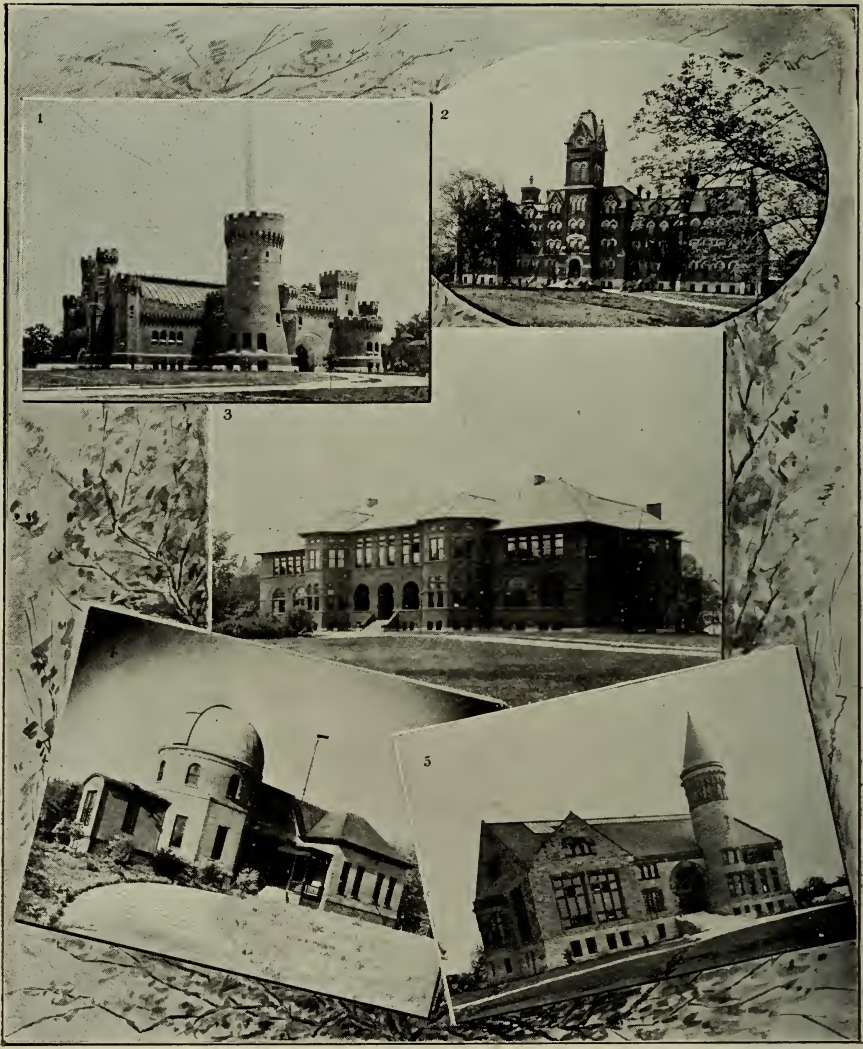


1—ARMORY AND GYMNASIUM 2—UNIVERSITY HALL
3—CHEMICAL HALL
4—EMERSON McMILLIN OBSERVATORY 5—ORTON HALL

The Ohio State University

Under an act of Congress passed July 2, 1862, the State of Ohio received from the United States a large grant of the public lands for the purpose of establishing a "college where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such a manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In accordance with this act, the Ohio State University was founded by the State as a public institution of learning. The governing body of the institution is a Board of Trustees, appointed by the Governor of the State for terms of seven years, as provided in the law organizing the University. The original endowment has been supplemented, and the objects of the University promoted, by a permanent annual grant from the United States, under an act of 1890, by special appropriations of the General Assembly; and in 1891, by a permanent annual grant from the State, which grant was doubled by the Legislature of 1896. Through the aid which has been received from the United States and from the State it is enabled to offer its privileges, with a slight charge for incidental expenses, to all persons of either sex who are qualified for admission.

The University is divided into six colleges as follows:

The College of Agriculture and Domestic Science.
The College of Arts, Philosophy and Science.
The College of Engineering.
The College of Law.
The College of Pharmacy.
The College of Veterinary Medicine.

Each of the above named colleges is under the direction of its own Faculty, which has power to act in all matters pertaining to the work of the students of that particular college. The aim of the University is to give to the young men and women of Ohio the largest possible opportunity for both general and special training, in order to prepare them for the various duties of life.

The University is situated within the corporate limits of the city of Columbus, two miles north of the Union Depot and about

three miles from the State Capitol. The University grounds consist of three hundred and thirty acres. The western portion, about two hundred acres, is devoted to agriculture and horticultural purposes, and is under the management of the College of Agriculture and Domestic Science. The eastern portion is occupied by the principal University buildings, eleven in number, the campus, athletic and drill grounds, a park-like meadow, and a few acres of primitive forest.

The College of Engineering

Since the inception of the University, the College of Engineering has manifested a vigorous and steady growth. To a large extent this growth represents the demand of the people from whom the University derives its support, for it has been the constant policy of the University to enlarge and foster each branch of educational work in response to every intelligent demand.

Yet it is true that the State has advanced and shaped public opinion by providing educational facilities somewhat in advance of public demand. Through its University it has established and built up a system of technical education which is more important than any other single agency in the development of the commercial and industrial interests of Ohio. The marvelous industrial progress made in this State and country in recent years is the best indication of the benefits which have already begun to accrue from the enlargement of technical training, and from its constant subdivision and expansion.

At present the College offers instruction in nine important fields of Engineering work. Covering these, the following four year courses of study are given:

1. *Architecture,* leading to the degree of Civil Engineer in Architecture (C. E. in Arch.). Established in 1900.
2. *Ceramics,* leading to the degree of Engineer of Mines in Ceramics (E. M. in Cer.). Established in 1896.
3. *Chemistry,* leading to the degree of Bachelor of Science in Chemistry (B. Sc.). Established in 1897.
4. *Civil Engineering,* leading to the degree of Civil Engineer (C. E.). Established in 1873.

5. *Electrical Engineering,* leading to the degree of Mechanical Engineer in Electrical Engineering (M. E. in E. E.). Established in 1889.

6. *Industrial Arts,* leading to the degree of Bachelor of Science in Industrial Arts (B Sc.). Established in 1893.

7. *Manual Training,* leading to the degree of Bachelor of Science in Industrial Arts (B Sc.). Established in 1893.

8. *Mechanical Engineering,* leading to the degree of Mechanical Engineer (M. E.). Established in 1879.

9. *Mining Engineering,* leading to the degree of Engineer of Mines (E. M.). Established in 1878.

The following short courses do not lead to degrees, but students completing them are furnished with formal certificates setting forth the work they have accomplished:

10. *Clay-working,* two years. Established in 1894.

11. *Industrial Arts and Shopwork,* two years, Established in 1896.

12. *Mining,* two years. Established in 1887.

The instruction necessary to the completion of these various courses of study is given in twenty-three different departments, under eighty-three professors and assistants. In addition, in some of the courses in this College elective work is offered, which may be taken from any of the thirty-seven departments of the University.

The various departments of the College of Engineering, or shared by this College, occupy about two-thirds of Chemical Hall, nearly the whole of Hayes Hall, the whole of the Mechanical and Electrical buildings, portions of Orton Hall and of the main University building. The equipment for teaching technical and scientific subjects is, in the main, excellent, and in some departments is exceptional. In all departments the annual increase in apparatus and facilities is rapidly making the equipment more perfect and complete.

The Library of the University, consisting of about 40,000 volumes and 10,000 unbound publications, is able to fill the demands of the Engineering students for the most important treatises in their respective fields of science.

DAYS AND DATES

1901

Entrance Examination (8 A. M.)	Monday,	September 16.
First Term begins — Registration Day	Tuesday,	September 17.
Lectures and Class-work begin	Wednesday,	September 18.
President's Address	Friday,	September 20.
Meeting of Trustees	Wednesday,	September 25.
Thanksgiving Recess	Thursday, Friday,	November 28. November 29.
Latest Date for Filing Thesis Subjects	Saturday,	December 14.
First Term ends	Wednesday,	December 18.

Christmas Vacation.

1902

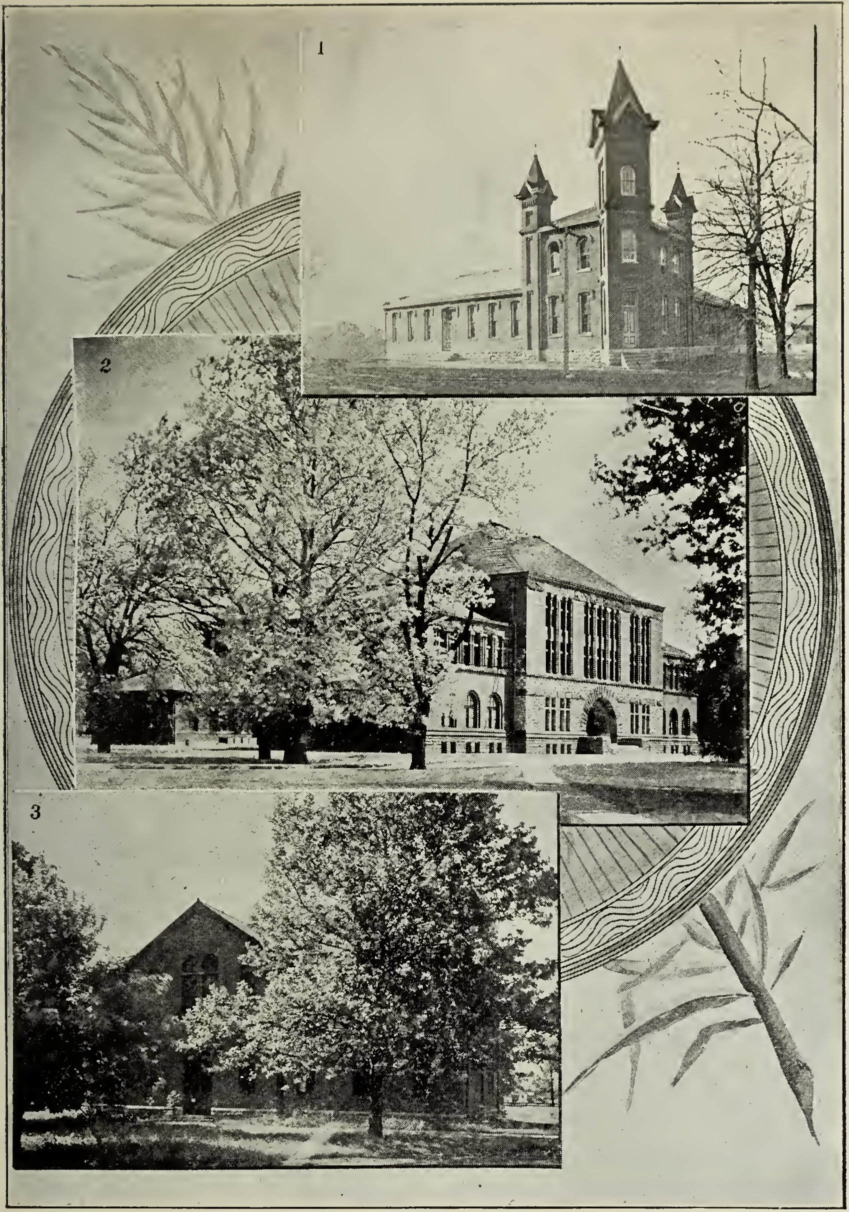
Second Term begins — Registration Day	Wednesday,	January 2.
University Day	Saturday,	February 22.
Second Term ends	Friday,	April 4.

Spring Recess.

Third Term begins — Registration Day	Wednesday,	April 9.
Meeting of Trustees	Wednesday,	April 9.
Field Day — Athletic Association	Saturday,	May 17.
Senior Vacation begins	Saturday,	May 24.
Competitive Drill, Cadet Battalion	Saturday,	May 24.
Memorial Day	Friday,	May 30.
Latest Date for presenting Thesis	Saturday,	June 7.
Final Examinations	Monday to Friday,	June 9. June 13.
Latest Date for filing Bound Copy of Thesis	Friday,	June 13.
Baccalaureate Sermon	Sunday,	June 15.
Entrance Examinations (8 A. M.)	Monday, Tuesday,	June 16. June 17.
Class Day	Monday,	June 16.
Meeting of Trustees	Tuesday,	June 17.
Alumni Day	Tuesday,	June 17.
COMMENCEMENT	Wednesday.	June 18.

Summer Vacation.

Entrance Examination (8 A. M.)	Monday,	September 22.
First Term begins — Registration Day	Tuesday,	September 23.
Lectures and Class-work begin	Wednesday,	September 24.
Annual Address by the President (11 A. M.)	Friday,	September 26.



1 — MECHANICAL HALL
2 — HAYES HALL
3 — ELECTRICAL BUILDING

Corps of Instruction

REV. WILLIAM OXLEY THOMPSON, D. D., LL. D.........University Grounds
President of the University.

NATHANIEL WRIGHT LORD, E. M., Dean............338 West Eighth Avenue
Professor of Metallurgy and Mineralogy and Director of the School of Mines.

SIDNEY AUGUSTUS NORTON, Ph. D., LL. D...........363 East Town Street
Emeritus Professor and Lecturer in General Chemistry.

STILLMAN W. ROBINSON, C. E., D. Sc.....................1353 Highland Street
Emeritus Professor of Mechanical Engineering.

BENJAMIN FRANKLIN THOMAS, Ph. D.....................University Grounds
Professor of Physics.

GEORGE WELLS KNIGHT, Ph. D..............................University Grounds
Professor of American History and Political Science.

ROSSER DANIEL BOHANNAN, B. Sc., C. E., E. M..16th and Indianola Avenues
Professor of Mathematics.

C. NEWTON BROWN, C. E...................................1343 Forsythe Avenue
Professor of Civil Engineering.

ERNST AUGUST EGGERS...............................190 West Eleventh Avenue
Professor of the Germanic Languages and Literatures.

ALBERT MARTIN BLEILE, M. D................................218 King Avenue
Professor of Anatomy and Physiology.

WILLIAM ASHBROOK KELLERMAN, Ph. D........175 West Eleventh Avenue
Professor of Botany.

BENJAMIN LESTER BOWEN, Ph. D..........................775 E. Broad Street
Professor of the Romance Languages and Literatures.

JOSEPH VILLIERS DENNEY, B. A.......................230 West Tenth Avenue
Professor of Rhetoric and the English Language.

EDWARD ORTON, Jr., E. M., Secretary......................The Normandie
Professor and Director of the Department of Clayworking and Ceramics.

WILLIAM T. MAGRUDER, M. E................................191 King Avenue
Professor of Mechanical Engineering.

J. P. GORDY, Ph. D., LL. D..............................350 West Seventh Avenue
Professor of Education.

WILLIAM McPHERSON, Jr., D. Sc., Ph. D..................65 Hamilton Avenue
Professor of Chemistry.

JOSEPH NELSON BRADFORD, M. E........................54 West Tenth Avenue
Professor of Drawing.

CLARENCE P. LINHART, M. D.......................................The Vendome
Professor of Physical Education and Director of the Gymnasium.

HENRY CURWEN LORD, B. Sc....................................University Grounds
Professor of Astronomy and Director of the Emerson McMillin Observatory.

FREDERICK CONVERSE CLARK, Ph. D........................1634 Neil Avenue
Professor of Economics and Sociology.

FRANK EDWIN SANBORN, S. B.........................303 West Eighth Avenue
Professor and Director of the Department of Industrial Arts.

FRANK ARNOLD RAY, E. M......................................137 King Avenue
Professor of Mine Engineering.

GEORGE L. CONVERSE, Captain U. S. A. (Retired).............398 Oak Street
Professor of Military Science and Tactics.

EMBURY ASBURY HITCHCOCK, M. E.................380 West Eighth Avenue
Professor of Experimental Engineering.

FRANCIS CARY CALDWELL, B. A., M. E................401 West Sixth Avenue
Professor of Electrical Engineering.

CHARLES SMITH PROSSER, M. S............................1362 Highland Street
Professor of Geology.

JOHN ADAMS BOWNOCKER, D. Sc............................1594 Neil Avenue
Professor of Inorganic Geology and Curator of the Museum.

OLIVE B. JONES..53 Eleventh Avenue
Librarian.

GEORGE WASHINGTON McCOARD, M. A................325 West Sixth Avenue
Associate Professor of Mathematics.

CHARLES WALTER MESLOH, M. A......................1627 North High Street
Associate Professor of the Germanic Languages and Literatures.

JAMES ELSWORTH BOYD, M. Sc..............................25 Maynard Avenue
Associate Professor of Mathematics.

CHRISTOPHER ELIAS SHERMAN, C. E..........................772 Oak Street
Associate Professor of Civil Engineering.

CHARLES A. BRUCE, B. A.................................234 West Tenth Avenue
Associate Professor of the Romance Languages and Literatures.

WILLIAM EDWARD HENDERSON, Ph. D.............41 West Eleventh Avenue
Associate Professor of Chemistry.

WILLIAM LUCIUS GRAVES, M. A........................1313 Forsythe Avenue
Assistant Professor of Rhetoric.

THOMAS EWING FRENCH. M. E.........................1458 Worthington Street
Assistant Professor of Drawing.

*CHARLES WILLIAM FOULK, B. A..............................Leipzig, Germany
Assistant Professor of Analytical Chemistry.

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* Absent on leave, for 1900–1901.

CHARLES LINCOLN ARNOLD, M. Sc....................328 West Eighth Avenue
Assistant Professor of Mathematics.

JOHN H. SCHAFFNER, B. A., M. S......................61 West Eleventh Avenue
Assistant Professor of Botany.

CHARLES BRADFIELD MORREY, B. A., M. D.................86 King Avenue
Assistant Professor of Anatomy and Physiology.

KARL DALE SWARTZEL, B. Sc.............................57 East Eighth Avenue
Assistant Professor of Mathematics.

GEORGE H. McKNIGHT, Ph. D.........................312 West Seventh Avenue
Assistant Professor of Rhetoric and the English Language.

HERRICK CLEVELAND ALLEN, LL. B......................275 East Gay Street
Assistant Professor of Rhetoric and the English Language.

WILLIAM ABNER KNIGHT, M. E........................206 West Lane Avenue
Assistant Professor of Machine-Shop Practice.

*FREDERICK ALAN FISH...
Assistant Professor of Electrical Engineering.

FREDERICK KESTER, M. E. in E. E............................1473 Neil Avenue
Instructor in Physics.

ALONZO HUBERT TUTTLE, B. A.........................215 West Tenth Avenue
Instructor in American History and Political Science.

WILLIAM HENRY RENCK...................................910 West Rich Street
Instructor in Pattern-Making and Founding.

CHARLES PHILIP CROWE...................................971 Highland Street
Instructor in Forging.

THOMAS KENYON LEWIS, B. Sc...........................1293 Dennison Avenue
Instructor in Drawing.

EDWARD EVERETT SOMERMEIER, G. Ph.....................1590 Neil Avenue
Instructor in Metallurgy and Mineralogy.

SILAS MARTIN...1269 Dennison Avenue
Instructor in Drawing.

SAMUEL EUGENE RASOR, B. Sc..................................1594 Neil Avenue
Instructor in Mathematics.

*ALBERT VICTOR BLEININGER...
Instructor in Ceramics.

*JOSEPH HENRY VOSSKUEHLER...
Instructor in Drawing.

*BERTHOLD AUGUST EISENLOHR...
Instructor in German.

J. WARREN SMITH.................................. ....55 Cleveland Avenue
Lecturer on Meteorology.

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* Appointment takes effect July 1st, 1901.

DON CARLOS HUDDLESON, G. PH........................249 West Lane Avenue
Assistant in Gymnasium.

FRANCIS MARTIN HAMILTON, B. A.....................1355 North High Street
Assistant in Philosophy and Education.

MELVIN DRESBACH, B. Sc., M. Sc.......................236 West Eighth Avenue
Assistant in Anatomy and Physiology.

FREDERICK JARED TYLER, B. Sc...........................43 East Ninth Avenue
Assistant in Botany.

WILLIAM LLEWELLYN DAVIES. ....212 West Tenth Avenue
Assistant in Civil Engineering.

SAMUEL VERNON PEPPEL, B. Sc.........................169 West King Avenue
Assistant in Ceramics.

SAMUEL SUMNER EDMANDS, B. S.....................237 West Eleventh Avenue
Assistant in Electrical Engineering.

EDGAR HOWARD MOORE, B. Sc.........................475 West Fourth Avenue
Assistant in German

SARAH BARROWS...85 West Tenth Avenue
Assistant in German.

HERBERT CHARLES GORE, B. Sc.........................185 West Ninth Avenue
Assistant in Chemistry.

RICHARD T. JONES, B. PH...........................172 North Seventeenth Street
Assistant in Romance Languages.

DANFORTH E. BALL.................................... .....565 East Broad Street
Emerson McMillin Fellow in Astronomy.

CHARLES BOYD SAYRE, B. A.....................................716 Neil Avenue
Fellow in American History and Political Science.

GEORGE WINFIELD FROST, M. E...............................1018 Neil Avenue
Fellow in Mechanical Engineering.

NILE OTIS FORD...61 West Eleventh Avenue
Fellow in Metallurgy and Mining.

HERBERT B. BROOKS.......................................477 West Seventh Avenue
Fellow in Physics.

HARRIET GRISWOLD BURR, B. A...........................1454 Highland Street
Fellow in Botany.

WILLIAM EDWARD BOHN, B. A., M. A...................43 West Eighth Avenue
Fellow in Rhetoric.

WALTER FISCHER, B. Sc....................................810 Franklin Avenue
Fellow in Botany.

ROYAL ALBERT ABBOT, B. PH..............................1364 Forsythe Avenue
Fellow in Rhetoric.

CLARENCE PHILANDER LINVILLE, B. Sc.............61 West Eighth Avenue
Fellow in Chemistry.

WILBUR LATIMER DUBOIS, B. Sc..........................61 West Eighth Avenue
Fellow in Chemistry.

CHARLES HUBBELL KIMBERLY, B. Sc..........................1300 Neil Avenue
Fellow in Chemistry.

SELDEN F. SMYSER, PH. B................................1451 Worthington Street
Fellow in Economics.

MARY W. RICE, B. A..844 Summit Street
Emerson McMillin Fellow in Economics.

JOHN FRANCIS TRAVIS, B. A..............................239 West Tenth Avenue
Fellow in Mathematics.

....

Fellow in Electrical Engineering.

HARRY HANCE...1093 East Long Street
Student Assistant in Chemistry.

WILLIAM EDGAR DAVIS...............................199 West Eleventh Avenue
Student Assistant in Mathematics.

CLARENCE L. E. MOORE...................................68 West Tenth Avenue
Student Assistant in Mathematics.

JOHN C. CHAMBERLIN...................................212 West Tenth Avenue
Student Assistant in Drawing.

ALBERT FREEMAN HALL.....................................1051 Highland Street
Machinist, Department of Mechanical Engineering.

JOHN PATTERSON COVAN...............................500 West Sixth Avenue
Machinist, Department of Electrical Engineering.

Courses of Study

All engineering education is based on the constant use of the fundamental sciences, mathematics, physics and chemistry, supplemented by training in the art of expression, both by language and by drawing. It naturally follows therefore that all engineering courses start from a common point, proceed side by side for a time, but specialize and subdivide more and more as they progress toward completion, until in the last year they present but little work in common.

Further, it is very commonly the case with young men entering college for a technical education, that they are following ambitions not founded on any knowledge of their own natural aptitudes or capacities, and that they are in no way prepared to make a wise or final selection of their life work at that time.

For the two foregoing reasons, the first years of each of the engineering courses leading to a degree, are made identical throughout. The student is enrolled as a "First-year Engineer." His selection of the course he wishes to pursue is deferred to the opening of his second year, by which time he has become acquainted to some extent with University standards and methods, with the scope of the various courses offered, and with his own tastes and powers.

FIRST YEAR

Note — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Mathematics (14) Plane Analytics.	5.	Mathematics (15,16) Trigonom. and Algebra.	5.	Mathematics (17) Plane Analytics.	5.
Chemistry (7) Inorganic.	5.	Chemistry (7) Inorganic.	5.	Chemistry (12) Qualitative Analysis.	4.
Modern Language French, Ger. or Spanish.	4.	Modern Language French, Ger. or Spanish.	4.	Modern Language French, Ger. or Spanish.	4.
Rhetoric (1) and (21) Composition.	2½.	Rhetoric (1) & (21) Composition.	2½.	Rhetoric (1) and (21) Composition.	2½.
Drawing (1) Freehand.	2.	Drawing (1) Freehand.	2.	Drawing (2) Lettering.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Drill.	

Military Drill is required of able-bodied male students, four hours per week up to the first of December. From that time till April first, two hours of drill are replaced by two hours per week of Gymnasium work, under supervision of the Director of Physical Training. After April first, four hours per week of drill are again required. In cases of physical disability, prescription work in the Gymnasium takes the place of drill.

COURSE IN ARCHITECTURE

This course is designed to produce men who unite a thorough knowledge of those phases of engineering which deal with the materials and methods of architectural construction, and a special training in appropriate and harmonious use of form, color, and decorative design.

Recent years have developed types of buildings without precedent in the history of architecture, in which the amount of unencumbered, internal space obtained is as remarkable as the safety, durability, comfort and healthfulness of the buildings themselves. The ends obtained in the modern, tall, steel-skeleton building would have been utterly impossible in the solid masonry structures of the past.

Mathematics, the foundation for the solution of constructive problems, is studied for two years, and in the technical work of the course its use is constant.

Drawing is an important factor in the education of the architect, and includes that of the engineer and of the artist, being controlled partly by considerations of fact and partly by those of appearance. It extends in some form throughout the course, including freehand, mechanical, descriptive geometry, shades and shadows, perspective, pen drawing, brush-drawing in color, clay-modeling; and is applied in the architectural designing.

The engineering technical work includes: strength of material, testing materials, stresses in trusses and framed structures, masonry, mortars, electricity and surveying.

The rapidly increasing application of electricity in modern buildings requires architects and superintendents of buildings to know the fundamentals of electric construction and, at least, the common sources of danger in its use. To meet this need the course in physics is supplemented with two terms of electrical engineering. For similar purposes in the safe installation of water and steam piping, elevators, and power, a laboratory course in experimental mechanical engineering succeeds the regular course in mechanics and strength of materials.

The history of architecture, necessary to broaden the student's architectural knowledge, is given a prominent place, and is freely illustrated by a selected set of lantern slides.

Decoration and ornament comprise a study of the decorative details of the different styles of architecture, both in carved ornament and decorative color.

The technical architecture includes: designing architectural structures complete, specifications, heating, ventilating, plumbing, estimates, fire-proofing, superintendence and contracts.

See also pages 39–40.

COURSE IN ARCHITECTURE

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	5.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Architecture (9) Hist'y of Architecture.	3.	Architecture (10) Hist'y of Architecture.	3.	Architecture (11) Hist'y of Architecture.	3.
Architecture (12) Detail Drawing.	2.	Architecture (13) Detail Drawing.	2.	Architecture (14) Detail Drawing.	2.
Drawing (14) Pen Drawing.	2.				
Military Drill.		Drill and Gymnasium.		Military Drill.	

Third Year

Mech. Eng'ring (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Architecture (15) Designing.	4.	Architecture (16) Designing.	2.	Architecture (17) Designing.	4.
Drawing (7) Photography.	2.	Drawing (12) Clay Modeling.	2.	Drawing (12) Clay Modeling.	2.
Elec. Eng'ring (6) Lectures.	2.	Elec. Eng. (6 & 7) Lectures and Lab.	4.		
Architecture (5) Decorations, etc.	3.	Civil Eng. (6) Stereotomy.	4.	Civil Eng. (19) Trusses.	5.
Rhetoric (2)	2.	Rhetoric (3)	2.	Rhetoric (3)	2.

Fourth Year

Architecture (18) Designing.	4.	Architecture (4) Specifications.	2.	Architecture (6) Estimates and Supt.	4.
Civil Eng. (15) Masonry.	5.	Architecture (7) Heating, Vent., etc.	5.	Architecture (19) Designing.	4.
Mech. Eng. (23) Materials of Const.	4.	Architecture (8) Designing.	5.	Architecture (20) Thesis.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Civil Eng. (21) Surveying.	3.
		Drawing (18) Color work.	3.	Drawing (19) Color work.	2.

THESIS

COURSE IN CERAMICS

The ceramic industries include, according to the classification here adopted, those industries in which the production and utilization of natural and artificial silicates is the end in view, viz., clayware, glass and cement. These three industries constitute a natural division of chemical technology, and though they are intimately connected with the field of the metallurgist on the one hand, and with the manufacturing chemist on the other, still they have an individuality which makes their study and exploitation as a separate field of industrial science advisable.

The work which the ceramic engineer must be prepared to supervise is broad and varied. In the preparation of any product of uniform physical and chemical qualities from the crude rocks and minerals of the earth's surface, a knowledge of chemistry is the foremost essential, and no one without the training of the chemical laboratory, in which an account must be rendered for everything, can hope to attain the highest mastery in this subject. In this course, therefore, chemistry forms an important part of the training, beginning with the first term and continuing through three years of purely chemical work, followed by a year of practice in the application of chemistry to ceramic operations.

But the ceramic engineer will be subjected to other calls on his resources. He must be able to intelligently search for and locate deposits of the crude mineral supplies which he needs, and having found them, he must be able to win them safely and economically, whether on the surface or under ground in mines. To this end, the student is given training in mineralogy, geology, both historic and economic, metallurgy, so far as it pertains to fuels and iron, and mine engineering.

Also, like the metallurgist, the ceramist deals with reagents and performs chemical reactions on a gigantic scale; and in the winning of the materials, their mechanical preparation, their economic handling and storage, their manufacture into useful forms, and in the construction of buildings, machinery, kilns and furnaces for these purposes, the knowledge and resources of the trained engineer must constantly re-enforce those of the chemist and geologist. Accordingly the course includes a vigorous drill in mathematics, physics, mechanics, strength of materials, drawing, drafting, shopwork and construction. In addition, at least one year of some modern language, preferably German, and two years in the correct use of the English language are required.

See also pages 44–48.

COURSE IN CERAMICS

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Ceramics (1) Laboratory.	5.	Ceramics (2) Laboratory.	5.	Ceramics (3) Laboratory.	5.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Third Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Ceramics (4) General Principles.	5.	Ceramics (5) Bricks.	5.	Ceramics (6) Pottery.	5.
Mine Eng. (4) Mine Surveying.	5.	Ceramics (7) Adv. Chem. Lab.	5.	Metallurgy (2) Mineralogy.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making.	2.	Rhetoric (3) Brief-Making.	2.
				Shopwork (11) Forging.	3.

Fourth Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Ceramics (9) Manf. of Bodies.	5.	Ceramics (10) Glasses and Glazes.	5.	Ceramics (11) Enamels, Colors.	5.
Metallurgy (4) Fuels and Iron.	5.	Ceramics (12) Cement.	5.	Ceramics (15) Thesis Work.	5.
Shopwork (4) Chipping and Filing.	3.	Ceramics (17) Ceramic Const.	4.	Mech. Eng. (25) Laboratory.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Drawing (7) Photography.	2.

THESIS

COURSE IN CHEMISTRY

This course has been prepared to meet the growing demand for trained men in the numerous manufacturing industries which are based upon chemical processes or employ them prominently in their work, and which are not included in the fields of metallurgy and ceramics. Among such may be mentioned the manufacture of acids, alkalies, salts, chemical reagents, paints, colors, dyes, bleaching powders, soaps, glue, gelatine, glycerine, tanning compounds, starch, sugar, dextrine and glucose, alcohol, ferments, preservatives, antiseptics, fertilizers, pyrotechnics, matches and many others.

In order to meet the demands of such widely diversified industries, it is necessary that the training offered shall be somewhat elastic and permit the student to specialize somewhat in advance of his graduation.

The work of the course is therefore partly required and partly elective.

The compulsory work is planned to meet two requirements: 1st, a thorough knowledge and grasp of the science of chemistry; and 2d, sufficient general training in engineering to enable the student to plan the execution of chemical work on a large scale, and with the mechanical aids necessary to commercial success.

The student begins his chemical work in the first year with general inorganic chemistry, followed by qualitative and quantitative analysis, metallurgical analysis, organic chemistry, inorganic preparations or the elements of manufacturing chemistry, sanitary analysis, advanced theoretical chemistry and a course of lectures on general applied chemistry, including a term each in the elements of metallurgy and ceramics.

In the engineering side, the requirements include mathematics, physics, drawing and shopwork. Besides the usual training in English, German is also compulsory on account of the large amount of chemical literature printed only in this language.

In the elective work opportunity is given to the student, under supervision of the head of the department, to frame his course according to the ultimate use to which he intends to put it. These electives begin in the second year and increase in amount as the student becomes more mature and better able to guage his purposes and abilities. In ordinary cases, where the student is fitting himself for some branch of chemical technology, he should elect further work in engineering, such as advanced mathematics, drafting, mechanics, strength of materials, machine design, thermo-dynamics, steam engineering, or applied electricity.

See also pages 49-51.

COURSE IN CHEMISTRY

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.
Chemistry (21) Physical Chemistry.	2.	Chemistry (21) Physical Chemistry.	2.	Chemistry (21) Physical Chemistry.	2.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Shopwork (7) Woodwork.	3.	Shopwork (11) Forging.	3.	Metallurgy (2) Mineralogy.	3.
German (1 or 5)	4.	German (1 or 5)	4.	German (1 or 5)	4.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Two full years of German are required of all students graduating in the chemical course. Those who arrive at the beginning of their second year without having begun it, must commence then, and must continue it in the place of work otherwise elective until the specified amount is completed. Those who enter with credit for Elementary German, and pursue advanced German in their first year, may elect other work in the second year.

In addition, two to three hours of electives are required throughout the year. The following are suggested: Mathematics, Drawing, Agricultural Chemistry, Physiology, History, Economics.

Third Year

Chemistry (8) Organic.	5.	Chemistry (9) Organic.	5.	Chemistry (9) Organic.	5.
Metallurgy (5) Laboratory.	5.	Metallurgy (6) Assaying.	5.	Metallurgy (5) Laboratory.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.

Electives five to eight hours throughout the year.

The following are suggested: Physical Laboratory, 3 to 5 hours; Geology, 5 hours — or Geology and Determinative Mineralogy, 5 hours; Shopwork, 3 hours; Agricultural Chemistry.

Fourth Year

Chemistry (17) Inorganic Prep.	4.	Chemistry (16) General.	3.	Chemistry (15) Sanitary.	4.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Applied.	5.	Ceramics (16) Gen'l Principles.	3.
		Physiology (8) Bacteriology.	2.		

Electives to make the total work equal sixteen or eighteen hours, including Thesis work.

Students may take Metallurgy 5 and 3 in place of Chemistry 16 and 15 and Physiology 8. Such students will take ore dressing in the first term.

THESIS

COURSE IN CIVIL ENGINEERING

The field of the civil engineer comprises mensuration or surveying and also construction in its broad sense.

While many of its departments have grown into distinct professions, civil engineering, the parent stem, remains with more and larger opportunities than ever before.

As all the problems of the engineer involve the principles of the sciences, these form the ground-work of the course, and while mathematics is the foundation, occupying three years either alone or in its applications, physics, chemistry, geology and astronomy are each given an important place.

The technical work embraces instruction in free hand and mechanical drawing, surveying and map-making, steel bridges and buildings, masonry structures, roads, streets, railways, water-supply, sanitary engineering, the testing of structural materials, and the fundamentals of steam and electrical machinery.

The drawing extends practically through the entire four years. It is designed to fit men to take responsible positions as draftsmen.

The work in surveying includes three terms' work in the text-book and field work on the campus. At the end of the second year, and again at the end of the third year, the surveying classes are taken into camp in a rough country and devote their entire time to surveying. It is expected to fit young men for at once taking charge of field engineering corps.

Two terms' work is required in steel construction, the first being devoted to the computation of stress, and the second to the designing, detailing and drawing of roofs, bridges, buildings and other framed structures. The practice of the best bridge shops is followed. The term's work in masonry structure treats of building materials, abutments and piers, retaining walls, dams and masonry arches. Roads, street and railway construction and maintenance are treated at length in text books and lectures. A term is devoted to each of the subjects of water supply and sanitary engineering.

All through the technical work, frequent references are made to periodicals, transactions of engineering societies and other works on engineering, and the student is required to become familiar with them.

The object sought in all the technical work is to give a thorough training in the theory of the subjects, to show how these are applied in practice and to give as much drill as possible in office and field methods.

See also pages 52–56.

COURSE IN CIVIL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y. Magnetism.	3.	Physics (2) Light, Sound.	3.
Civil Eng. (1) Land Surveying.	6.	Civil Eng. (4) Topography.	4.	Civil Eng. (2) Railroad Surveying.	6.
Military Drill.		Drill and Gymnasium.		Military Drill.	

SUMMER COURSE

Civil Engineering (22) 4 weeks, of 6 days per week. Field work in land and railroad surveying.

Third Year

Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Civil Eng. (3) Topog. Surveying.	4.	Civil Eng. (24) C. E. Drawing.	5.	Civil Eng. (7) Bridge Stresses.	5.
Civil Eng. (16) Roads and Streets.	5.	Civil Eng. (6) Stereotomy.	4.	Drawing (7) Photography.	2.
Astronomy (2) Mathematical.	3.	Astronomy (2) Mathematical.	3.	Astronomy (2) Mathematical.	4.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.

SUMMER COURSE

Civil Engineering (23) 4 weeks, of 6 days per week. Field work in railroad and topographical surveying.

Fourth Year

Civil Eng. (8) Bridge Designing.	5.	Civil Eng. (17) Railways.	5.	Civil Eng. (18) Water Supply.	5.
Civil Eng. (15) Masonry.	5.	Civil Eng. (14) Cement Testing.	2.	Civil Eng. (10) Sanitary Eng.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6 and 7) Lectures and Lab.	1.		
		Mech. Eng. (17) Laboratory.	3.	Mech. Eng. (25) Laboratory.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.		

THESIS

COURSE IN ELECTRICAL ENGINEERING

The object of this course is to give such training as shall enable the graduate to successfully take up practical work in those branches of engineering in which electricity plays the principal part. In general, the training needed for this purpose is the same as that of the Mechanical Engineer, except that the student need have only a general familiarity with other methods of power generation and utilization, and must, of course, make a very thorough study of the subject of electricity. Consequently, the first two years of the two courses are alike, except as regards shopwork and physics.

A considerable part of the first two terms of the third year is occupied by a thorough training in elementary electrical engineering measurement, such as currents, voltage, capacity, inductance, magnetic flux, etc. This work is given in the physical department (see Physics, Course 6, page 88). The third year also includes training in mechanics, mechanism, machine design, and strength of materials, the latter taught both in the class-room and in the laboratory. In the last term the study of steam machinery is commenced. Work on dynamo machinery is begun in the class-room in the second term, and followed up during the third term in the laboratory.

In the last year of the course, engines and boilers are studied during the first term in the class room, and during both the first and second terms in the laboratory. Instruction in electrical engineering forms the main part of the work of this year. It is carried on in the class-room, drawing room, and laboratory, and includes besides a thorough course in alternating current machinery, courses on power transmission and upon the application of electricity. Throughout the whole of this year a part of the work is elective, and is chosen by the student subject to the approval of the head of the department. The end which is kept most in view, is the training of the student to think for himself, and to solve for himself the problems of the engineer.

Work in the class-room is done partly by text book and partly by lecture and recitation, preference being given to the former, where satisfactory books are available. The work is illustrated by the use of the projection lantern, diagrams and illustrative apparatus. Much stress is laid on the solution of numerical problems by the student. In the drawing room, designs are made of dynamo machinery of different kinds, transformers, house wiring, transmission, etc., the work here being as far as practicable based on the theoretical conclusions reached in the class and laboratory. The equipment is good and is increasing.

See also pages 62–66.

COURSE IN ELECTRICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (11) Forging.	2.			Physics (5) Laboratory.	4.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making.	2.
Shopwork (4) Chipping, Filing.	2.	Shopwork (13) Machine Work.	3.		
Military Drill.		Drill and Gymnasium.		Military Drill.	

Instruction in wood-working is given in this course. It does not appear in this Catalogue, owing to intended rearrangements of the shopwork courses, which will include a summer course of four weeks.

Third Year

Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Physics (6) Laboratory.	5.	Physics (6) Laboratory.	5.	Mech. Eng. (32) Power Plants.	5.
Physics (4) Elect'y, Magnetism.	3.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng. (28) Laboratory.	2.
Shopwork (14) Machine Work.	3.	Elec. Eng. (8) D. C. Machinery.	4.	Ind. Arts (7) Mach. Design.	3.
Drawing (5) Technical.	3.			Elec. Eng. (9) Laboratory.	4.

Fourth Year

Elec. Eng. (10) A. C. Machinery.	3.	Elec. Eng. (10) A. C. Machinery.	3.	Elec. Eng. (13) Applications.	5.
Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (14) Designing.	4.	Elec. Eng. (14) Designing.	4.
Mech. Eng. (33) Engines and Boilers.	5.	Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (11) Laboratory, Thesis.	5.
Mech. Eng. (29) Laboratory.	3.	Elec. Eng. (12) Transmission.	2.		
		Mech. Eng. (30) Laboratory.	2.		
*Elective	3–5.	*Elective	3–5.	*Elective	3–5.

THESIS

* Subject to the approval of the Professor of Electrical Engineering.

COURSE IN INDUSTRIAL ARTS

This course is designed for those who may desire to occupy positions in the various branches of manufacture, not as engineers, but as practical managers, superintendents or business men.

As the growth of engineering has brought about its subdivision into many special lines such as civil, mechanical, electrical, mining and chemical engineering, and established special training for each, so the increase in size, importance and scope of the manufactures of the country has made it desirable to especially train young men with reference to filling positions of trust and responsibility in them: to so educate them that they can readily learn the treatment or processes in any special line of manufacture and be able to intelligently superintend: and that they can initiate and put into successful operation new industrial enterprises, or extend and improve old ones.

With this idea in view this course has been planned to give the student special training along industrial and business lines, together with a certain amount of general culture. There will be found in the course a large amount of science training by which the processes of manufacture based upon these laws may be more readily understood; practice in the different shops and in drawing so that a good working knowledge of such operations may be acquired as well as training given to eye and hand, and power of observation and thought along mechanical lines developed: studies into the principles and methods governing the production of the chief materials of construction, the different mechanical movements and their combination in machinery, the use of materials in various constructions, electrical machinery and steam power plants, together with laboratory practice: also the relations of capital and labor, the problems of trade, and the conduct of business enterprises.

This course is well adapted to meet the needs of those young men already employed in industrial pursuits at the machine or bench, who are ambitious to advance to positions of greater responsibility and influence. This course offers an excellent opportunity to such men: it gives them four years of earnest work under good instructors to direct and assist personally, and the advantages of laboratory work to supplement the theoretical book-work. Those intending to take this course should first prepare themselves to meet the entrance requirements as given on page 106. Those unable to spend four years in this course will find on page 36 a short course requiring two years.

All choice of electives must be made in consultation with the head of the department and receive his approval.

See also pages 70–72.

COURSE IN INDUSTRIAL ARTS

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (2) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Eeconomics (2) Industrial Society.	2.	Economics (3) Indus. and Fin. Hist.	2.	Economics (4) Transportation Problems.	2.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Third Year

Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designings.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping and Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Mech. Eng. (32) Power Plants.	5.
		Mech. Eng. (22) Timber and Masonry.	3.		
Economics (1*a*) Elem. of Polit. Econ.	4.	Economics (1*a*) Elem. of Polit. Econ.	2.		
		History (1*b*) U. S. Political.	2.	History (1*b*) U. S. Political.	4.

Fourth Year

Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Shopwork (17) Adv. Mach. Work.	3.
Elect. Eng. (6) Lectures.	2.	Elect. Eng. (6) Lectures.	2.	Civil Eng. (21) Surveying.	3.
Elect. Eng. (7) Laboratory.	2.	Elect. Eng. (7) Laboratory.	2.		
Industrial Arts (3) Shop Equipment.	3.	Industrial Arts (3) Shop Appliances.	3.	Industrial Arts (3) Shop Management.	3.
Industrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.
Mech. Eng. (28) Laboratory.	2.	Mech. Eng. (29) Laboratory.	2.	Mech. Eng. (30) Laboratory.	2.
Polit. Science (11) Polit. Inst. of U. S.	3.	Economics (6) Railroads, Crises, etc.	2.	Economics (7) Labor and Capital.	2.

THESIS

COURSE IN MANUAL TRAINING

This course is designed for those students who wish to become teachers of manual training in the public schools of secondary grade or in the technical schools. Such manual training is based upon knowledge of the relation of the body and brain; its educational value is very great, and recognition of its importance is causing it to be put into more of the schools of the country each year. The advancement of manual training in the schools is retarded by one factor at least, and that is the lack of teachers suitably trained to instruct in its different branches. This course is planned to meet this demand. It is necessary that a teacher of manual training in our public schools be of the same high standard as his associates, in character, general culture, uplifting influence. He must possess knowledge of the methods of instruction, ability in the art of teaching; and coupled with these he must have skill in his technical lines. He must be familiar with the tools, materials and processes used, and acquainted with the different effects on his pupils of the training and work with these. He must understand that enlarged power and ability in the student is what he is seeking; that the pupil himself, and not the inanimate object used, is the real product of manual training.

As this course is a professional one, the studies found in it are those which will both broadly and specifically train for the end in view. There is a large amount of science work in physics and chemistry, which work is of importance on account of its fundamental character and the preparation it gives for teaching those subjects. The shopwork of the different kinds will furnish the necessary knowledge and the training of the hand, eye and brain; the drawing will give familiarity with that mode of expression of ideas. The industrial arts treat of mechanical movements and their application to machine tools. There is work in the subjects of electrical machinery and steam power plants that the teacher may be capable of dealing with the power used in his shopwork. The studies in the educational field will present the principles underlying education, the part which the different subjects have in the unfolding or development of the pupil, the laws of this development, so that he can deal intelligently with his pupils.

As the course is arranged the student completing the work will be ready for the teaching of manual training of the high school grade; of the drawing accompanying it; also of the science he may have chosen. Thus he may be able to accept a position in some school where manual training is not taught and can gradually introduce it as opportunity offers.

All choice of elective work must be made in consultation with the head of the department and receive his approval.

See also pages 70–72.

COURSE IN MANUAL TRAINING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Mak'g.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Education (1) Elem. Psychology.	3.	Education (1) Elem. Psychology.	3.	Education (1) Elem. Psychology.	3.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Third Year

Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
Botany (9) Dendrology.	2.	History (1*b*) U. S. Political.	2.	History (1*b*) U. S. Political.	4.
Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.
Chemistry (21) Physical.	2.	Chemistry (21) Physical.	2.	Chemistry (21) Physical.	2.
or		or		or	
Physics (5) Laboratory.	5.	Physics (5) Laboratory.	5.	Physics (5) Laboratory.	5.

Fourth Year

Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Mech. Eng .(32) Power Plants.	5.
Elect. Eng. (6) Lectures.	2.	Elect. Eng. (6) Lectures.	2.	Mech. Eng. (28) Laboratory.	2.
Elect. Eng. (7) Laboratory.	2.	Elect. Eng. (7) Laboratory.	2.	Education (5) Science of Educ.	4.
Education (5) Science of Educ.	4.	Education (5) Science of Educ.	4.		
Polit. Science (11) Polit. Inst. of U. S.	3.				
Electives	2–5.	Electives	5–7.	Electives	5–7.

THESIS

COURSE IN MECHANICAL ENGINEERING

Mechanical Engineering deals principally with the generation of power or effective energy from the forces of nature and the utilization of this power through mechanical devices. The fundamental science underlying this profession is physics, especially that part of physics relating to mechanics and heat, though mathematics is the medium by which these physical principles are made applicable to practical problems.

The training given in the course is designed to equip men with such general and technical knowledge, that they can enter at once and with equal ease into positions in any of the numerous subdivisions of mechanical engineering, and adapting themselves to the needs of the stituation, can rapidly acquire the experience which is essential to that particular work. And at the same time it must be noted that no one lacking this broad preliminary view of the profession as a whole, can ever expect to attain the highest skill in any one of its specialties.

The technical work of the course begins with physics, which is taught by a year's text book course, supplemented by two terms of laboratory work. This is followed in turn by mechanics, mechanism, the strength of materials, bridge stresses, machine design, thermodynamics, prime movers, steam boilers, shop appliances, hydraulic machinery, and the metallurgy of fuel, iron and steel.

The theoretical principles of these subjects cannot be made real and practical to the student except by an extended system of laboratory courses. Three such are provided, in shopwork, drawing and experimental engineering, respectively. The shopwork course trains the student in those handicrafts in constant use in all mechanical industries, viz., forging, chipping and filing, carpentry, pattern-making, foundry work, and the use of the principal metal-working machine tools.

The course in drawing includes free hand drawing, lettering, projection, descriptive geometry, shades, shadows and perspective and technical drawing, all leading up to the three terms of machine design which teach the student to use this drawing as one of the important tools of his profession.

The experimental engineering, coming in the last year of the course, gives the student opportunity to gain familiarity with boiler tests, determinations of the efficiency of steam power-plants, gas engines, hydraulic and refrigerating machinery, measurements of friction, losses of power in transmission, and many other important technical problems, and is of the greatest use to the student in enabling him to face practical work with confidence in himself.

See also pages 74–79.

COURSE IN MECHANICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Shopwork (11) Forging.	3.	Physics (7) Laboratory.	2.	Physics (7) Laboratory.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Shopwork (3) Foundry.	2.	Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Instruction in wood-working is given in this course. It does not appear in this Catalogue, owing to intended rearrangements of the shopwork courses, which will include a summer course of four weeks.

Third Year

Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Mech. Eng. (12) Laboratory.	2.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng. (3) Mechanism.	2.
Drawing (5) Technical.	3.	Mech. Eng. (22) Timber, Masonry.	3.	Drawing (7) Photography.	2.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Civil Eng. (19) Trusses.	5.
Shopwork (14) Machine Work.	3.	Shopwork (15) Adv. Mach. Work.	4.	Mech. Eng. (32) Power Plants.	5.
Mathematics (11) Diff. Equations.	1.				

Fourth Year

Mech. Eng. (33) Engines and Boilers.	5.	Mech. Eng. (34) Thermodynamics.	5.	Mech. Eng. (19) Machine Design.	5.
Mech. Eng. (27) Laboratory.	5.	Mech. Eng. (14) Laboratory.	4.	Mech. Eng. (15) Laboratory.	3.
Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (21) Thesis.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Industrial Arts (5) Shop Appliances.	3.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.	Mech. Eng. (31) Hydraulic Machinery.	3.

THESIS

COURSE IN MINING ENGINEERING

The profession of mining engineering is peculiar in the wide range of work it covers. It involves two distinct fields; that of the engineer, presented in the locating, exploiting and operating of mining properties, and that of the chemist and metallurgist in the reduction of ores and the treatment of fuels, as in coke manufacture. A man may devote himself largely to either of these departments, but a competent understanding of both is essential to the successful designing and development of mining or metallurgical plants.

The course preparatory to such a profession must be a broad one, including a thorough training in general science, especially chemistry, mathematics, mineralogy and geology, as well as in the use of English, and, as far as possible, foreign languages.

With this as a foundation there must be given special instruction in the arts which are related particularly to mining and metallurgy, and which usually furnish the first employment to the graduate, such as drafting, surveying, technical chemical analysis and assaying. Experience has shown that these subjects can be so taught in college as to enable a man to be of use in the industry during the time in which he is acquiring that experience and judgment which are essential to his ultimate success.

Finally the advanced work of the profession must be fully treated. Such work naturally occupies the later years of the course, being necessarily preceded by the mathematics and the general science training. The course which follows has been framed on these general principles.

The third year is largely devoted to special professional studies. The work in metallurgy is extended and developed in special lectures on the metals, their properties and reduction, fuel, furnaces, refractory materials and the principles of slag formation and furnace charging. Fire assaying of gold, lead and silver ores is taught practically.

The engineering side of the course is developed in this year by training in the principles of construction, as given in mechanics, strength of materials and truss stresses. Surveying is taught by lectures, recitations and extended field practice.

In the fourth year of the course the problems of mine engineering and metallurgical constructions are developed in lectures covering the theory and practice of mine development and operation, furnace construction and design, etc., and are supplemented by practical work in the drafting room and by visits to accessible mines and metallurgical works for study and comparison.

See also pages 80–86.

COURSE IN MINING ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (18) Space Analytics.	5.	Mathematics (19) Calculus.	5.	Mathematics (20) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.
Shopwork (7) Woodwork.	2.	Shopwork (11) Forging.	2.	Metallurgy (2) Mineralogy.	3.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Third Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (6) Mechanics.	5.	Mech. Eng. (7) Strength Materials.	5.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) General.	5.	Metallurgy (3) Deter. Mineralogy.	5.
Mine Eng. (4) Mine Surveying.	5.	Metallurgy (6) Assaying.	5.	Civil Eng. (19) Trusses.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.

Fourth Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Mech. Eng. (25) Laboratory.	5.
Metallurgy (8) Ore Dressing.	2.	Metallurgy (7) Metal Construction.	3.	Mine Eng. (6) Plans and Specifications.	5.
Elect. Eng. (6) Lectures.	2.	Elect. Eng. (6) Lectures.	2.	Drawing (7) Photography.	2.
Elect. Eng. (7) Laboratory.	2.	Elect. Eng. (7) Laboratory.	2.		
		Geology (7) Petrography.	2.		
		THESIS			

COURSES NOT LEADING TO A DEGREE

The following short courses are offered by the University, in the belief that they will meet the needs of a large class of young men who for any reason will not or cannot obtain the benefits of the thorough courses already described. The University recognizes that there are many valid reasons which may stand in the way of some, whose ability to receive and use the highest forms of education is without question, and it is thought that in extending opportunities for such training as will be available to these young men, the University is filling a longfelt want in the scheme of engineering education and is certain to grow into closer contact with the industrial life of the State.

No diploma is given to those who complete these courses, but a certificate is issued stating the list of studies which the student has taken in his course, and in which his work has been satisfactory.

The requirements for admission to these short courses are very much lower than for admission to regular collegiate work. It is clear that to reach the young men for whom these courses have been designed, it is necessary that the conditions of admission and attendance shall be shorn of every complication and that the opportunity extended shall be within the grasp of all, and with the minimum of formality or restriction. It is considered, however, that those who accept these opportunities are men, mature in character and steadfast in their purpose to gain sufficient technical education for their needs, and who are making a sacrifice of time at an age when time has begun to be precious.

The somewhat elementary character of some of the work of these courses may attract the attention of some, who as candidates for admission to regular collegiate work could not be admitted on account of insufficient preparation. To all such students it is proper to state that these courses are in no sense designed as preparatory schools for those who desire ultimately to enter college, and it is not the purpose of the college to permit such use to be made of them. Therefore, every candidate for admission to the short courses, will be expected to satisfy the Committee on Entrance that his previous experience will enable him to utilize this opportunity in a proper way.

SHORT COURSE IN CLAY-WORKING

The two-year or industrial course is designed to assist young men who have already been actively engaged in the Ceramic industries, and who, on account of mature years, or lack of means, or lack of previous educational advantages, are unable to avail themselves of the full and complete course, and yet who wish to increase their earning power or chances of promotion by fitting themselves for other than routine labor. The requirements for admission to this course are very low, and the work required throughout is much less severe than that of the four-year course; in fact, anyone who is willing to really apply himself, can retain his membership in this class, but there is no place for any but those who are thoroughly in earnest, and poor work will not be accepted from those who are able to do good work.

In short, in this industrial course, the department recognizes its closest medium of communication with the wants of the clay industries, and it is intended to so maintain this course as always to render the greatest good to the greatest number.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (7) Inorganic.	5.	Chemistry (7) Inorganic.	5.	Chemistry (12) Analytical.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Mathematics (1) Algebra.	5.	Mathematics (3*a*) Geometry.	5.	Shopwork (11) Forging.	3.
				Shopwork (4) Chipping, Filing.	2.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Second Year

Ceramics (1) Chem. Analysis.	5.	Ceramics (2) Analysis of Clays.	5.	Ceramics (3) Analysis of Glazes.	5.
Ceramics (4) Gen. Principles.	5.	Ceramics (5) Brick.	5.	Ceramics (6) Pottery.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Drawing (11) Mechanical.	5.
		Drawing (1) Freehand.	2.		
Military Drill.		Military Drill.		Military Drill.	

See also pages 44–48.

SHORT COURSE IN INDUSTRIAL ARTS

This course is primarily designed to extend the benefits of the same kind of training as that given in the four-year course in this subject to that class of young men who may be unable for any reason to undertake a course of four years' duration, but who aspire to become actively engaged in factory work. It has been the aim to give, in as condensed a form as possible, those studies which will most rapidly and easily be turned to practical account in manufacturing operations; such as drawing, shopwork, use of machine tools, etc., together with a grounding in the physics and mathematics which underlie these operations.

The course will be found most valuable to young men already engaged in factory work, who find themselves limited from rising in their work on account of lack of technical education.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.
Drawing (8) Geometric.	2.	Drawing (8) Projections.	2.	Drawing (2) Lettering.	2.
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Plane Geometry.	5.	Mathematics (13) Space Geometry.	5.	Mathematics (14) Trigonometry.	5.
Shopwork (7) Pattern Making.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (11) Forging.	3.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Shopwork (3–4) Foundry, Filing.	5.	Shopwork (13) Machine Work.	5.	Shopwork (15) Adv. Mach. Work.	5.
Military Drill.		Military Drill.		Military Drill.	

See also pages 70–72.

SHORT COURSE IN MINING

The short course in mining is especially designed for young men who have had practical experience in mines, and wish to study mine surveying, drafting, the problems of ventilation, drainage, haulage, mine operating, etc., and also something of the sciences bearing upon their work, but have neither the time nor the preparation for a full college course. The first year is devoted to a thorough study of the elementary mathematics and sciences necessary to prepare the student for the practical work of the second year. The experience of the past fourteen years has shown beyond any doubt that any enterprising young miner can master the subject sufficiently well in the time assigned to materially increase his earning capacity and chances for promotion in his occupation.

Personal instruction is given, and it is made thoroughly practical and of such a character as to best adapt it to the needs of the individual student.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Geometry.	5.	Mathematics (13) Geometry.	5.	Mathematics (14) Trigonometry.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Military Drill.		Drill and Gymnasium.		Military Drill.	

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (1) Freehand.	2.	Drawing (4) Drafting.	3.	Drawing (2) Lettering.	2.
Drawing (3) Projections.	3.	Geology (4) Elementary.	5.	Shopwork (11) Forging.	3.
Chemistry (7) Inorganic.	5.	Chemistry (13) Laboratory.	3.	Metallurgy (9) Mineral Chemistry.	5.
Mine Eng. (1) Mine Surveying.	5.	Mine Eng. (2) Ventilat. Haulage.	5.	Mine Eng. (3) Mine Operating.	5.
Military Drill.		Military Drill.		Military Drill.	

See also pages 80–86.

MECHANICAL DRAWING ROOM
FREE HAND DRAWING ROOM

Departments of Instruction

ARCHITECTURE

(DEPARTMENT OF DRAWING.)

Office, Hayes Hall, Room 22

Professor Bradford

This work is carried on in the rooms of the Department of Drawing, occupying the third floor of Hayes Hall. The material equipment, in addition to that of the Department of Drawing, consists of models in plaster and wood illustrating the constructive and ornamental forms of the different styles of architecture, a collection of architectural photographs and lantern slides, architectural drawings and specifications of erected structures, a collection of plates of architectural forms and ornament, samples of material used in constructive work, instruments for experimental work in heating and ventilating, such as anemometers, weather bureau hygrometers, carbonic acid testers and thermometers. The heating apparatus of the several buildings of the University provide valuable material for this work.

The many and varied architectural structures, which are being continually erected in the city of Columbus and which the students can visit and inspect, furnish material of a practical nature the value of which cannot be overestimated.

The library contains very valuable technical and historical architectural literature.

4. **Specifications.** Lectures and practice in preparing Specifications for Architectural Structures. Two periods a week. (Second Term, fourth year, Course in Architecture.)

5. **Decoration and Ornament.** Lectures on the different styles of carved ornament and decorative color. The practice part of this subject will be incorporated in the clay Modeling and Designing. Three periods a week. (First term, third year, Course in Architecture.)

6. **Estimates and Superintendence.** Lectures and practice in preparing estimates for structures designed in Courses 8, 11, 12 and 13, and the duties of superintendence. Four periods a week. (Third Term, fourth year, Course in Architecture.)

7. **Heating, Ventilating and Plumbing.** Lectures and experimental work. Lectures on the principles and methods of heating and ventilating and of sanitary plumbing. Experimental work is carried on with the heating and ventilating plants in the different University buildings. Five periods a week. (Second Term, fourth year, Course in Architecture.)

8. **Designing.** Lectures and Practice. Steel skeleton and fire proof construction. Five periods a week. (Second Term, fourth year, Course in Architecture.)

9. **History of Architecture.** Lectures illustrated by lantern slides. Three periods a week. (First Term, second year, Course in Architecture.)

10. Same as 9. (Second Term, second year, Course in Architecture.)

11. Same as 10. (Third term, second year, Course in Architecture.)

12. **Architectural Drawing.** Drawing architectural ornament, details of orders and styles, with the special object of impressing upon the student's mind the architectural characteristics considered in Course 9. Two periods a week. (First Term, second year, Course in Architecture.)

13. Same as 12. (Second Term, second year, Course in Architecture.)

14. Same as 13. (Third Term, second year, Course in Architecture.)

15 **Designing.** Lectures and practice in designing structures adapted to modern requirements. Four periods a week. (First Term, third year, Course in Architecture.)

16. **Designing.** Lectures and practice. Two periods a week. (Second Term, third year, Course in Architecture.)

17. **Designing.** Lectures and practice. Four periods a week. (Third Term, third year, Course in Architecture.)

18. **Designing.** Four periods a week. (First Term, fourth year, Course in Architecture.)

19. **Designing.** Four periods a week. (Third Term, fourth year, Course in Architecture.)

20. **Thesis.** Original design, to be accompanied with written description, specifications and estimate. Five periods a week. (Third Term, fourth year, Course in Architecture.)

ASTRONOMY

Office, Emerson McMillin Observatory

Professor H. C. Lord, Mr. Ball

The importance of a practical knowledge of the methods of astronomical observation to Civil Engineers made the establishment of the Emerson McMillin Observatory a very important advantage to the College of Engineering. The instruction given to the Engineering students includes the use of this fine equipment in practical work under the immediate supervision of the Director.

The building and its equipment is the gift of Mr. Emerson McMillin, of Columbus, Ohio, and was built during the summer of 1895. The first floor is divided by a hall and stairway into two parts. The east wing contains an office, library, clock room and a large, well lighted room furnished with tables for the students, where they reduce their observations and keep the records of their work. The west wing contains the transit house, the dome and photographic dark room. The transit house is a light frame structure, so designed as to be kept as free as possible from heat radiated by any heavy wall of masonry. The dome is a wooden framework covered on the outside with canvas.

The equipment consists of a twelve-inch equatorial telescope, mounting by Messrs. Warner & Swasey, objective by Mr. Brashear, with a large and powerful spectroscope by Mr. Brashear. This instrument is adapted to use either one or two prisms or a grating, and is provided with a double set of objectives, one corrected for the visual and one for the photographic rays; a position micrometer with a seven-inch circle by Messrs. Warner & Swasey; a combined zenith telescope and transit instrument of three inches clear aperture by Mr. G. N. Saegmuller; a sidereal clock by Clemens Riefler, of Munich; a comparater by Carl Ziliss; a four-inch portable equatorial by Alvin Clark; a chronograph by Warner & Swasey; sextants, chronometers, meteorological instruments, etc. There is also provided a spectroscopic laboratory, equipped with a Brashear concave grating spectroscope, a two-horse power gas engine and dynamo; a storage battery, and a large induction coil. In addition to the above, Mr. McMillin's gift provides for an excellent astronomical library.

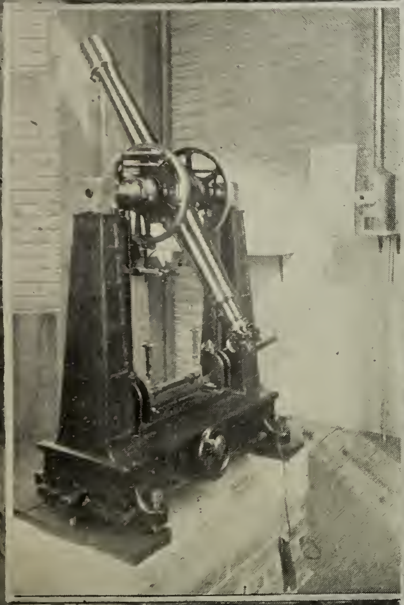
2. **Astronomy, Geodosy and Least Squares.** Lectures on practical Astronomy, supplemented by practice with the instruments of the Emerson McMillin Observatory. Text-book, Doolittle. Three times a week. (Three Terms, third year, Course in Civil Engineering.)

BOTANY

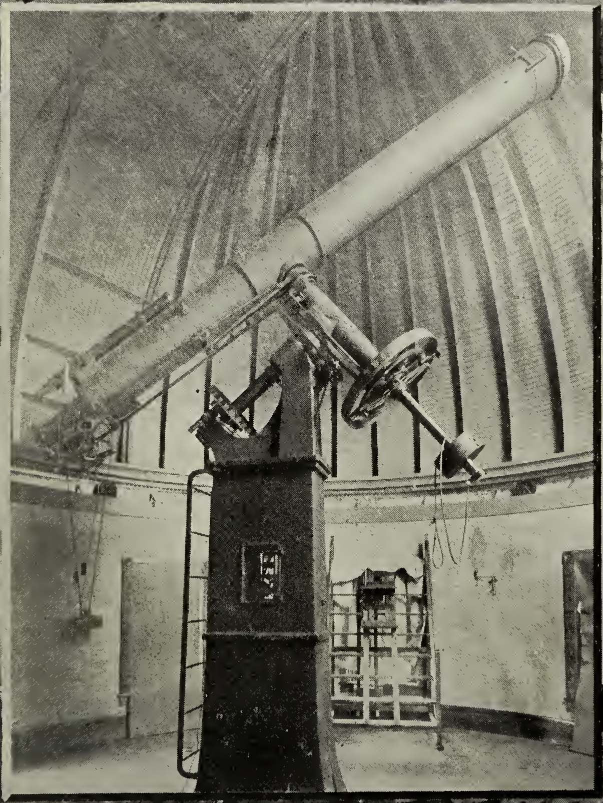
Office, Botanical Hall

Professor Kellerman

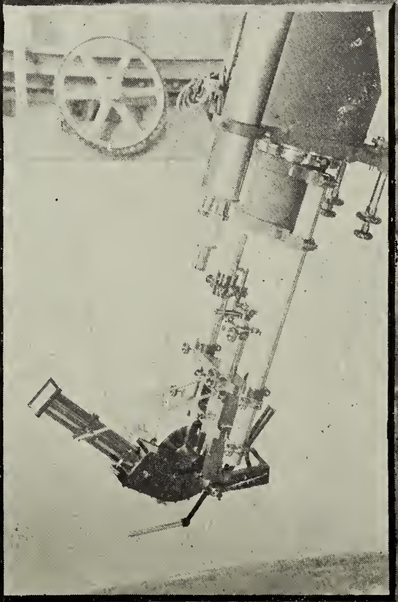
9. **Dendrology.** Lectures and field work. Kellerman's Forest Trees of Ohio and reference books are used. The native trees are studied and illustrative collections made. Twice a week. (First Term, third year, Course in Manual Training.)



TRANSIT



12-INCH TELESCOPE



SPECTROSCOPE

CERAMICS

(DEPARTMENT OF CLAY WORKING AND CERAMICS)

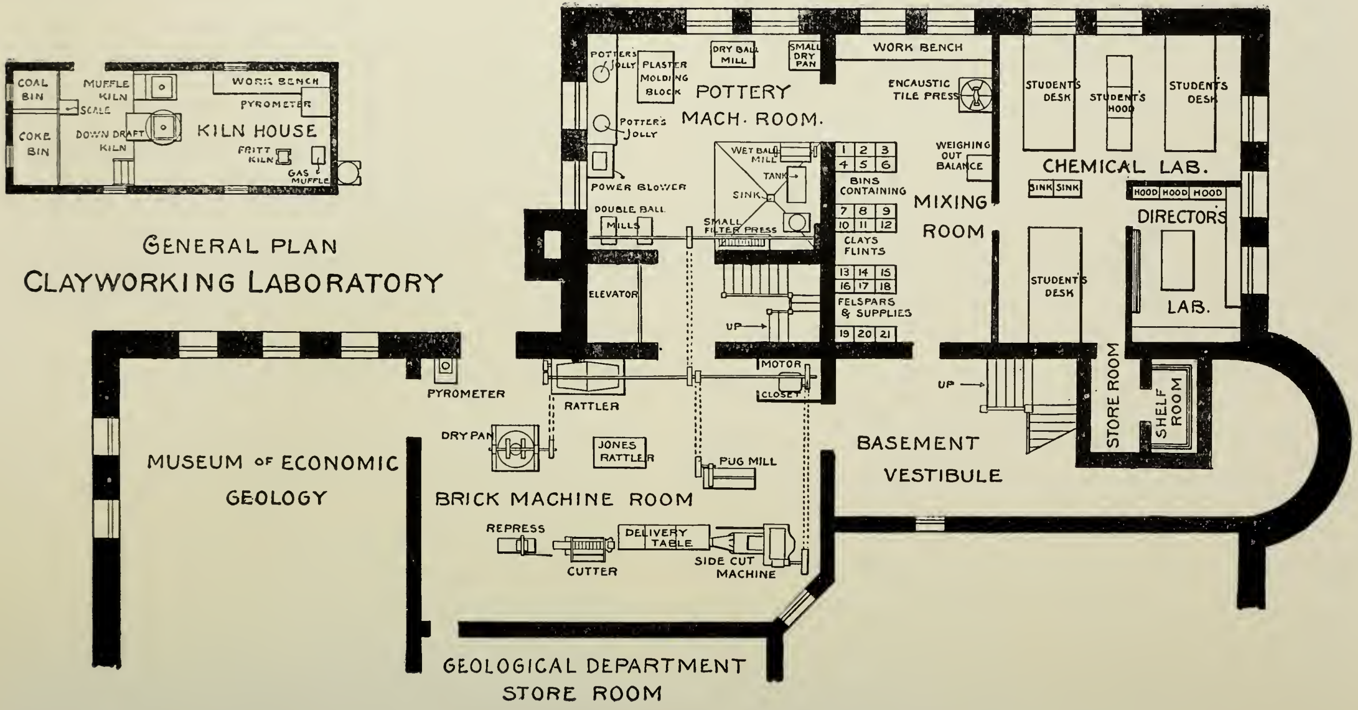
Office, Orton Hall, Room 4

Professor Edward Orton, Jr., Mr. Peppel, Mr. Bleininger

The facilities of the Department for study in the field of clay working comprise: 1st. A convenient chemical laboratory, specially designed and equipped for the analysis and decomposition of silicates. Provision has been made for the use of hydrofluoric acid with safety, and the platinum ware has been made to order with this purpose in view. 2d. A complete mechanical outfit for the preparation of clays for pottery manufacture and the production of the ware itself, of any grade from earthen wares to porcelain. The machinery is of the latest types and comprises all important varieties in use for grinding, tempering, washing, filtering and molding. 3d. A similar plant for the manufacture of brick, tiles, pipes and hollow goods. The machinery here is of full size and samples up to a ton in weight can be received and transformed into the finished articles by any or all of the standard methods in commercial use. The power for this purpose is derived from a fine electric motor, driven from the University power plant. 4th. A kiln house, equipped with a kiln in which several hundred bricks, or an equivalent quantity of sewer pipe, stoneware, or pottery can be burnt. The fuel is intended to be coke, except in special cases where the fuel available for burning clay wares is to be made the subject of test. There is also provided a crucible melting furnace and a muffle furnace for testing glazes. A muffle kiln of larger size for burning pottery, glazed ware and decorated wares has recently been put into operation. 5th. A ceramic museum, containing a collection of American pottery and clay products of every class, is in process of installation. 6th. A library of the best literature on the subject, mainly German, but containing a few English and French works, and the trade periodicals.

The facilities of the Department for study in the field of cement and mortar materials comprise in addition to the foregoing plant, much of which is especially well suited to this purpose, the following special apparatus. 1st. An improved dry-ball-mill, of chilled iron for grinding the raw material together, and for grinding the cement clinker. 2d. A small cupola, fired with coke and using air blast, for the vitrification of the refractory silicates used. 3d. Access to the complete and well appointed cement testing laboratory of the Department of Civil Engineering.

These facilities permit the Department to offer exceptional opportunities to any who wish to specialize in this important field of manufacture.

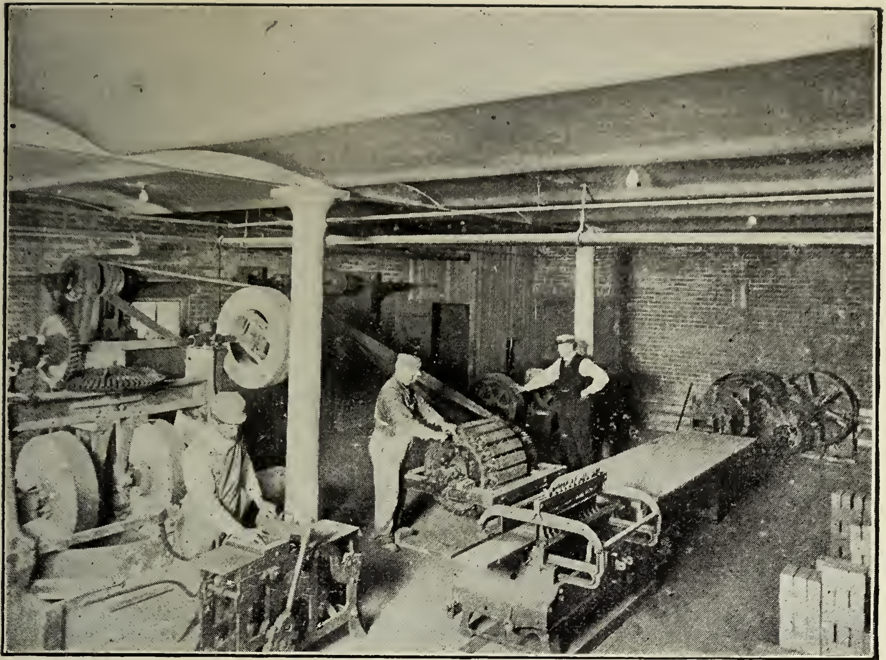


GENERAL PLAN
CLAYWORKING LABORATORY

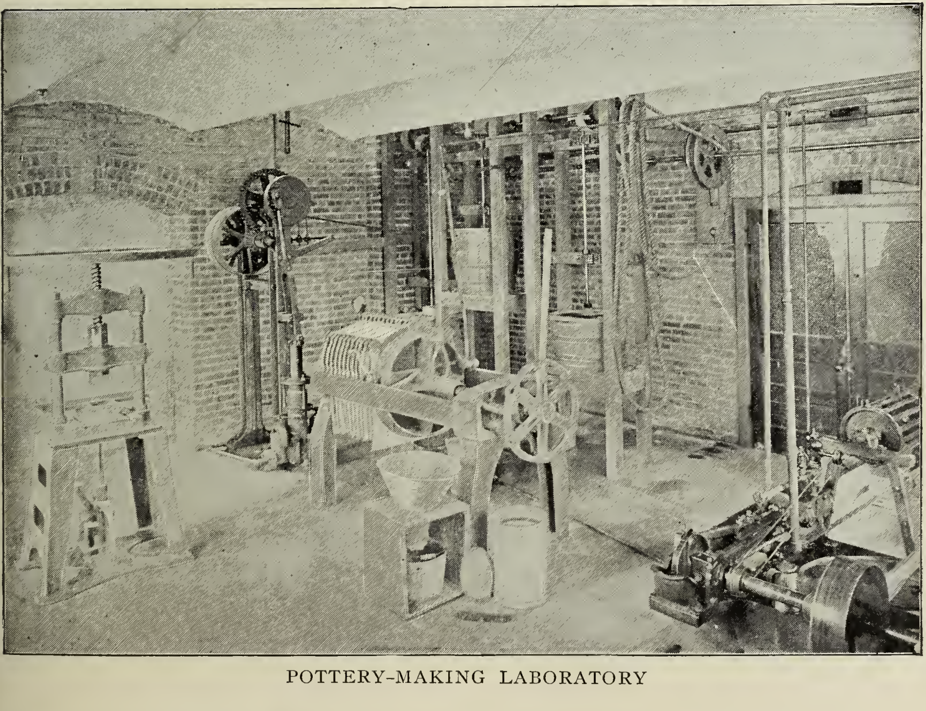
1. **Ceramic Chemistry.** This course is open only to those who have Completed General Chemistry 12. The student begins the quantitative analysis of salts and chemicals, and later works on limestone and other easy materials. Five times a week. (First Term, second year, Course in Ceramics and Short Course in Clay-working.)
2. Continuation of Course 1. The student begins the quantitative analysis of clays and complex minerals, working first on samples of known composition, and later on unknown materials. Five times a week. (Second Term, second year, Course in Ceramics and Short Course in Clay-working.)
3. Continuation of Course 2. The student completes the ultimate analysis of clays and begins the proximate or "Rational" analysis of clays and pottery bodies, following the methods of Seger. Five times a week. (Third Term, second year, Course in Ceramics and Short Course in Clay-working.)

4. **Lectures on Clay Manufacture** (supplemented by frequent recitations). The origin, composition and properties of clays and other minerals employed in the clay, glass and cement industries. Five times a week. (First Term, third year, Course in Ceramics; and second year, Short Course in Clay-working.)
5. Continuation of Course 4. A series of lectures, with recitations, on the general principles of the manufacture of bricks and the coarser clay wares, including the selection and winning of the materials, their preparation, manufacture, burning and testing. Five times a week. (Second Term, third year, Course in Ceramics; and, second year, Short Course in Clay-working.)
6. Continuation of Course 5. A series of lectures, with recitations, on the classification and manufacture of pottery and the finer grades of clay wares, including the selection of the materials, preparation of the bodies, manufacture of the ware, preparation of the glazes, burning and decoration of the wares and the pyrometry of ceramics. Five times a week. (Third Term, third year, Course in Ceramics; and, second year, Short Course in Clay-working.)

7. **Ceramic Chemistry.** Continuation of Course 3. Open only to those who have completed that course. The analysis of glasses and glazes, devoting special attention to the use of hydrofluoric acid in silicate analysis, and to the determination of lead and boracic acid. Five times a week. (Second Term, third year, Course in Ceramics.)



BRICK-MAKING LABORATORY



POTTERY-MAKING LABORATORY

9. **Laboratory Work in Ceramics.** Open only to those who have completed Courses 3 and 6. The student will undertake the production of such wares as are made from single clays; then wares made by blending two or more natural clays; and, then, such wares as are made from an artificial body. In each case the bodies made will be burnt and tested. Five times a week. (First term, fourth year, Course in Ceramics.)

10. Continuation of Course 9. The student will practice on the production of glasses and glazes, beginning with the natural "slip glazes" and taking successively the soft raw-lead glazes, the fritted lead-boracic-acid glazes, and the hard-fire leadless porcelain glazes. In each case the glazes will be made for use on some definite body, and will be made to "fit." Five times a week. (Second Term, fourth year, Course in Ceramics.)

11. Continuation of Course 10. The student will practice on the use of the coloring and opacifying oxides in glazes, and on the production of colors for the decoration of pottery, and of body-stains. Five times a week. (Third Term, fourth year, Course in Ceramics.)

12. **Lectures on Cement Manufacture.** The theory of hydraulicity, the compounding, manufacture and testing of natural and Portland cements and hydraulic silicates. Open to students who have had courses 3 and 6. Facilities for laboratory work in making, burning and testing cements will be given. Five times a week. (Second Term, fourth year, Course in Ceramics.)

15. **Thesis.** See requirements for graduation, page 107.

16. **General Principles of Applied Ceramics.** A series of lectures on the chemical technology of the clay, glass and cement industries. Three times a week. (Third Term, fourth year, Course in Chemistry.)

17. **Practice** in making drawings and specifications for brick kilns, brick dryers, pottery kilns, gas producers, glass pot-furnaces, glass tanks, cement kilns and burning cylinders. Students will be allowed to specialize along the lines they intend to follow. Four times a week. (Second Term, fourth year, Course in Ceramics.)

CHEMISTRY

Office, Chemical Hall, Room 20

Professor McPherson, Professor Norton, Associate Professor Henderson, Assistant Professor Foulk, Mr. Gore, Mr. Linville, Mr. Dubois, Mr. Kimberly, Mr. Hance

The Department of Chemistry occupies the larger portion of the Chemical Hall. The main lecture room is situated on the second floor and has a seating capacity of one hundred and seventy-five persons. There are four main laboratories; one for students in elementary chemistry and qualitative analysis, accommodating two hundred and fifty; one for quantitative analysis with desks for fifty; one for advanced qualitative and sanitary analysis and one for organic chemistry, each with accommodations for twenty. In addition to these, there is an office, a balance room, three private laboratories and several smaller rooms, used for combustion work, spectroscopic work and private investigations.

The laboratories are equipped with all the modern conveniences, as water, gas, steam ovens, drying ovens, automatic air blasts, electric lights, etc. Distilled water is piped from the large still in the attic to each room.

Each student has his own desk with drawers and locker. All supplies are obtained from the chemical store room which is liberally supplied with all the apparatus and material necessary for chemical investigation.

The Department is also well equipped with all apparatus necessary for experimentally illustrating the class room work. The main lecture room is furnished with cases which contain a large collection of specimens for purposes of illustration.

7. **Elementary Chemistry.** Inorganic. Lecture, Laboratory and Quiz. Laboratory work: First Term, experiments upon the non-metals; Second Term, principles of qualitative analysis. Five times a week. (First and Second Terms, first year, all four-year courses and Short Course in Clay-working; and First Term, second year, Short Course in Mining.)

8. **Organic Chemistry.** Lectures. Five times a week. (First Term, third year, Course in Chemistry.)

9. **Organic Chemistry.** Laboratory. Five times a week. (Second and Third Term, third year, Course in Chemistry.)

12. **Qualitative Analysis** Four times a week. (Third Term, first year, all four-year courses and Short Course in Clay-working.)

13. **Qualitative Analysis.** Three laboratory periods a week. (Second Term, second year, Short Course in Mining.)

15. **Sanitary Analysis.** Laboratory and lectures. A study of the most important chemical methods for the analysis of water and air. Four times a week. (Third Term, fourth year, Course in Chemistry.)

16. **Applied Chemistry.** Lectures on Industrial Chemistry. These are made as practical as possible by visits to different chemical works. When possible specialists deliver lectures on subjects belonging to their particular line of work. Three times a week. (Second Term, fourth year, Course in Chemistry.)

17. **Inorganic Preparations.** Four times a week. (First Term, fourth year, Course in Chemistry.)

20. **Quantitative Analysis.** Laboratory, lectures and recitations. Use of the balance and general principles of gravimetric analysis. Drill in the solution of problems in quantitative analysis; study of properties of precipitates; principles of volumetric analysis. Selections are made from such analytical methods as best meet the needs of the students. The samples used for analysis are mixtures or commercial products, the percentage composition of which is not made known to the student until he has reported his own results. Four times a week. (First, Second and Third Terms, second year, Course in Chemistry.) (Chemistry 20 and 21 alternative with Physics 5, First, Second and Third Terms, third year, Course in Manual Training.)

21. **Advanced General Chemistry.** Physical Chemistry. This course includes (*a*) a general survey of inorganic chemistry based upon the arrangement of the elements in accordance with the periodic law, and (*b*) a discussion of the main principles of physical chemistry and their application to general chemical processes. Twice a week. (First, Second and Third Terms, second year, Course in Chemistry.) (Chemistry 20 and 21 alternative with Physics 5, First, Second and Third Terms, third year, Course in Manual Training.)

For courses in the technical analysis of iron, steel, ores, fuels, fluxes, clays, etc., see the Departments of Metallurgy and Ceramics.

CHEMICAL LECTURE ROOM

CIVIL ENGINEERING

Office, Hayes Hall, Room 13

Professor Brown, Associate Professor Sherman, Mr. Davies

The Department occupies the east and west wings of the second floor and one basement room in Hayes Hall. The large and well lighted room of the east wing, 38′ x 47′, is equipped with 48 drawing tables and is used for the department drawing classes. A large case of drawers filled with shop drawings, working drawings and maps, gathered from practicing engineers, is open to students for study and consultation. These drawings lay before them good examples of engineering practice. A considerable outfit of office drawing instruments is provided for those students requiring them in special work. This includes long steel straight edges, large triangles, parallel rulers, protractors, section liners, planimeter, pantograph, etc.

In the west wing are the instrument and blue print rooms, and the recitation room, equipped with electric lantern. The instruments for instruction in surveying include one high grade transit, seven other transits fitted for various kinds of surveying, four leveling instruments, solar compass, solar attachments for two transits, two high grade aneroid barometers, rods, chains, tape lines, hand levels, two current meters for measuring flow of water in streams. There is also a complete camp outfit for the summer field work in surveying.

The blue print room has three large frames and abundant facilities for preparing paper and washing prints.

There is a collection of models for illustration of bridge and roof trusses and of problems in sterotomy. Numerous photographs of bridges and other engineering structures are included.

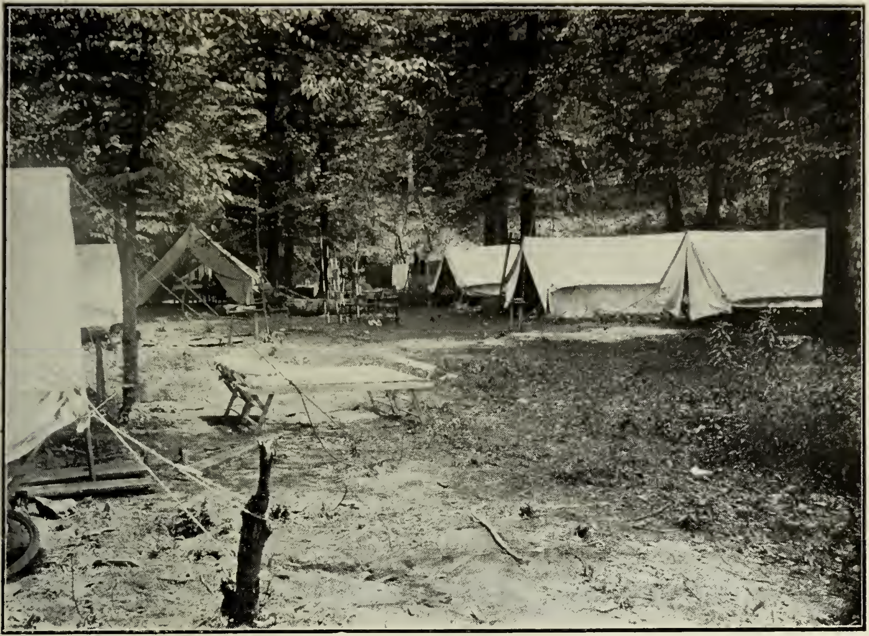
The basement room, 23′ x 38′, is equipped for cement testing with two testing machines, a Boehme hammer, briquette molds, sieves, hot test apparatus, etc.

The Department has, for rating current meters, an excellent course 175 feet long in one side of the reservoir belonging to the University Power Plant.

1. **Land Surveying.** Recitations and field work. Johnson's Theory and Practice of Surveying. Six times a week. (First Term, second year, Course in Civil Engineering.)

2. **Railroad Surveying.** Recitations and field work. Searle's Field Engineering. Six times a week. (Third Term, second year, Course in Civil Engineering.)

3. **Topographical Surveying.** Lectures, field work and drawing. Johnson's Surveying used for reference. Four times a week. (First Term, third year, Course in Civil Engineering.)



SUMMER CAMP.

CLASS IN SURVEYING

4. **Topography.** Platting, pen and tinted work. Reed's Topographical Drawing and Sketching. Four times a week. (Second Term, second year, Course in Civil Engineering.)

6. **Stereotomy.** Recitations, drawing and model cutting. Warren's Stereotomy. Four times a week. (Second Term, third year, Courses in Architecture and Civil Engineering.)

7. **Bridge Stresses.** Recitations and lectures. Part I of Dubois's Stresses in Framed Structures. Five times a week. (Third Term, third year, Course in Civil Engineering.)

8. **Bridge Designing.** Lectures and drawing. Part II of Dubois's Stresses in Framed Structures and Johnson's Modern Framed Structures used for reference. Five times a week. (First Term, fourth year, Course in Civil Engineering.)

10. **Sanitary Engineering.** Lectures. Five times a week. (Third Term, fourth year, Course in Civil Engineering.)

14. **Civil Engineering Laboratory.** Cement testing, adjustment of instruments. Twice a week. (Second Term, fourth year, Course in Civil Engineering.)

15. **Masonry Construction.** Recitations and lectures. Baker's Masonry Construction. Five times a week. (First Term, fourth year, Courses in Architecture and Civil Engineering.)

16. **Highways.** Recitations and Lectures. Byrne's Roads and Streets. Five times a week. (First Term, third year, Course in Civil Engineering.)

17. **Railway Location.** Recitations and lectures. Wellington's Economic Theory of Railway Location. Five times a week. (Second Term, fourth year, Course in Civil Engineering.)

18. **Water Supply.** Recitations and lectures. Five times a week. (Third Term, fourth year, Course in Civil Engineering.)

19. **Trusses.** Lectures and drawing. Five times a week. (Third Term, third year, Courses in Architecture, Mining and Mechanical Engineering.)

21. **Surveying.** Recitations and field work. Davies' Surveying. Three times a week. (Third Term, fourth year, Courses in Architecture and Industrial Arts.)

22. **Summer Course in Field Work.** The students are taken into camp in a rough, broken country and given a thorough drill in land and elementary railroad surveying. The course begins directly after commencement day, and continues four weeks of six days per week, ten hours per day. The work of the student and the discipline of the camp is in the hands of competent instruc-

1 — MEASURING VELOCITY OF CURRENTS

2 — MAKING CROSS SECTION OF RIVER BED

tors. This course must be preceded by Courses 1, 2 and 4. Students conditioned on any of these courses may be admitted at discretion of instructor in charge. (At conclusion of second year of course.)

23. **Summer Course in Field Work.** Similar to Course 22. Students work on advanced railroad surveying and topographical surveying. This course must be preceded by Courses 3, 22 and 24. Students conditioned in any of these courses may be admitted at discretion of instructor. (At conclusion of third year of course.)

24. **Drawing of Engineering Structures.** Five hours a week. (Second Term, third year, Course in Civil Engineering.)

AT WORK IN THE FIELD.

MODELING ROOM

PHOTOGRAPHIC LABORATORY

DRAWING

Office, Hayes Hall, Room 22

Professor Bradford, Assistant Professor French, Mr. Lewis, Mr. Martin, Mr. Chamberlin

The Department occupies the entire third floor and one room in the basement of Hayes Hall, and is provided with the following equipment for the illustration of the work in drawing and for practical training in the same:

For freehand drawing, water color and oil painting: — A large studio thirty-five by eighty feet, specially arranged and provided with adjustable tilting tables and easels, a well selected collection of pencil, pen and ink, charcoal and color specimens of work, wooden models of geometric forms, plaster-casts of ornaments, flowers, fruit and the antique.

For clay-modeling: — A specially arranged and equipped studio twenty-six by thirty-two feet for modeling in clay and casting in plaster, consisting of modeling stands, moisture box, casting table, modeling tools of wood and steel, stove and vent-hood for the preparation of gelatine molds, and lockers.

For mechanical drawing and mechanical and architectural designing: — A large, well lighted room forty by eighty-five feet, provided with O. S. U. drawing tables (30″ by 36″ tops), a set of Schroeder models, a collection of shop drawings and facilities for blue-printing.

For photography: — A well arranged and equipped dark-room, printing apparatus, copying camera, six view cameras, lenses of long and short focus, telephotographic lens, shutters for instantaneous exposures and an excellent outfit for photo-micrography.

In addition to the above, the library contains a well selected collection of books pertaining to the work of the Department.

1. **Free Hand Drawing.** Practice and occasional lectures. Pencil, charcoal, pen and water-color drawing from copies, models and plaster casts.

   One drawing period a week. (First, Second and Third Terms, first year, Short Course in Industrial Arts.)

   Two drawing periods a week. (First Term, second year, Short Course in Mining; and Second Term, second year, Short Course in Clayworking.)

   Two drawing periods a week. (First and Second Terms, first year of all four-year courses.)

2. **Lettering.** Practice and occasional lectures.

   Two drawing periods a week. (Third Term, first year, Short Course in Industrial Arts; and second year, Short Course in Mining.)

Three drawing periods a week. (Third Term, first year, all four-year courses.)

This course must be preceded by Course 1.

3. **Mechanical Drawing.** Lectures or recitations one period a week: Practice two periods a week. Subjects: Orthographic, Isometric and Oblique Projection and elementary Working Drawings. (First Term, second year, all four-year courses, except Chemistry; and Short Courses in Mining and Industrial Arts.)

   Lectures or recitations two periods a week. Practice one period a week Short Course in Industrial Arts and in all four-year courses except Architecture, Chemistry and Civil Engineering; three periods a week in Architecture and Civil Engineering. Subject: Descriptive Geometry. (Second Term, second year.)

   Lectures or recitations, one period a week. Practice, two periods a week in Short Course in Industrial Arts and in all four-year courses, except Architecture and Chemistry; four periods a week in Course in Architecture. Subject: Shades, Shadows and Perspective. (Third Term, second year.)

   This course must be preceded by Course 2.

4. **Draughting and Blue-printing.** Practice and occasional lectures. Three periods a week. (Second Term, second year, Short Course in Mining.)

   This course must be preceded by the first term of Course 3.

5. **Technical Drawing.** Lectures and practice. Rules and methods for making working drawings in machine design, to correctly represent form and dimensions for shop use, and for tracing and blue-printing the same. Three periods a week. (First Term, third year, Courses in Mechanical and Electrical Engineering, Industrial Arts and Manual Training.) This course must be preceded by Courses 2 and 3.

7. **Photography.** Lectures and practice. Lectures: Optics of Photography, Chemistry of Photography, Exposing and Developing, Printing, Lantern Slides, Orthrochromatic Photography and some of the applications of Photography. Practice in outdoor, interior, instantaneous and flashlight photography, copying, lantern slides and printing. Two periods a week. (First Term, third year, Course in Architecture; Third Term, third year, Courses in Civil and Mechanical Engineering; Third Term, fourth year, Courses in Ceramics and Mining Engineering.)

8. **Mechanical Drawing.** Lectures and practice. Geometric and Projection Drawing. Two periods a week. (First and Second Terms, first year, Short Course in Industrial Arts.)

11. **Mechanical Drawing.** Lectures and practice. Five periods a week. (Third Term, second year, Short Course in Clay-working.)

12. **Clay Modeling.** Modeling in clay and casting in plaster ornamental forms from designs, photographs, nature and original designs. Two periods a week. (Second and Third Terms, third year, Course in Architecture.)
    This course muse be preceded by Course 1.
14. **Pen Drawing.** Two periods a week. (First Term, second year, Course in Architecture.)
    This course must be preceded by Course 1.
18. **Water Color Painting.** Three periods a week. (Second Term, fourth year, Course in Architecture.)
19. **Water Color Painting.** Two periods a week. (Third Term, fourth year, Course in Architecture.)

ECONOMICS AND SOCIOLOGY

Office, University Hall, Room 18

Professor Clark, Mr. Smyser.

Course 1 must precede all other courses except 2, 3 and 4.

1. **Elements of Political Economy.** Text-book, lectures and individual investigations. A careful study of the laws of production, exchange, distribution and consumption of wealth; combined with an analysis of the industrial actions of men as regards land, labor, capital, money, credit, rent, interest, wages, etc.
   (a.) (Four hours a week, First Term; two hours a week, Second Term, third year, Course in Industrial Arts.)
2. **Industrial Society.** Twice a week. (First Term, second year, Course in Industrial Arts.)
3. **Industrial and Financial History.** Twice a week. (Second Term, second year, Course in Industrial Arts.)
4. **Transportation Problems.** Lecture. A study of the development and present economic status of roads, canals and railroads in their relation to industry and to the state. Twice a week. (Third Term, second year, Course in Industrial Arts.)
6. **Railroads, Crises, Tariff.** Twice a week. (Second Term, fourth year, Course in Industrial Arts.)
7. **Labor and Capital.** Twice a week. (Third Term, fourth year, Course in Industrial Arts.)

EDUCATION

Office, University Hall, Room 54

Professor Gordy, Mr. Hamilton

1. **Elementary Educational Psychology.** This course is helpful to three classes of students: (1) Those who are not preparing to teach, but who wish to make some study of education in order that they may perform their duties as members of society more intelligently; (2) Those intending to teach and who wish to study the relations between psychology and education; and (3) Those preparing to be superintendents of schools and who wish to get suggestions as to the best method of teaching psychology to teachers. Three times a week. (First, Second and Third Terms, second year, Course in Manual Training.)

The Science of Education. This course makes a study of the ends of education, educational values, and methods of teaching. It will be found valuable not only to those intending to teach, but to all who hope to exert an intelligent influence on the decision of educational questions. Four times a week. (First, Second and Third Terms, fourth year, Course in Manual Training.)

ELECTRICAL ENGINEERING

Office, Electrical Building, Room 8

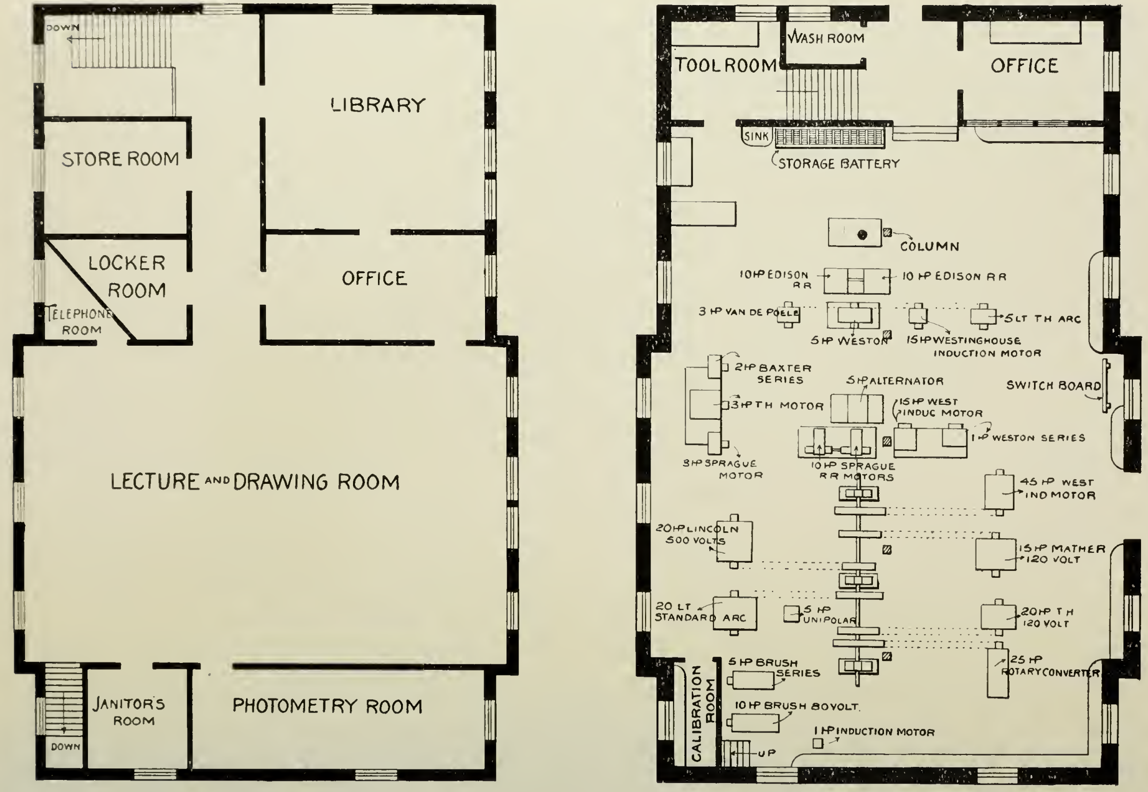
Professor Caldwell, Mr. Edmands, Mr. Fish

This Department has excellent facilities for practical experimental work with dynamo machinery and other electrical apparatus. The elementary electrical testing is provided for in the Physical Department, which permits this Department to devote its time to engineering apparatus proper. The dynamo equipment consists of twentysix machines of various makes and sizes from 40–H. P. down; aggregating over 240 horsepower. These include 110 and 500 volt direct and alternating current generators, polyphase motors, arc and incandescent lighting generators, railway and stationary motors, a rotary converter specially designed for experimental work, and a unipolar dynamo. The two latter, with an alternating current generator and a 2–phase motor, were built by the students, it being the policy of the Department to build much of its apparatus. There are also a number of transformers of different makes, including one for welding and one of special design for testing, both built at the University. Arc lamps of different styles, a 10 kilowatt–hour storage battery, condensers, resistances, circuit breakers, and magnetic testing apparatus also form part of the equipment. The measuring instruments include a standard Weston voltmeter with standard resistances and cells and twelve other Weston volt and ammeters, also four Kelvin static voltmeters, five dynamometers, two wattmeters, galvanometers and 15 other ammeters and voltmeters of different makes. There is a telephone laboratory with apparatus for comparative tests, a variety of transmitters and receivers, lines running to another building, and material illustrative of switch–board practice. Photometry is given at present in the Physical Laboratory, where the equipment in this line is excellent. A large 200,000 volt transformer is being built by some of the students of the Department.

Power for running the dynamo laboratory is supplied by three induction motors from the University Power Plant. There is also a small but well selected and growing collection of photographs, blue–prints, and material illustrative of electrical manufacture. The library of the Department is on the second floor and is especially valuable on account of the completeness of its sets of periodicals and transactions.

The University Power Plant (see page 96) is of great value as illustrative of a model installation. This plant has been mostly installed by students who receive pay for such work.

There is a machine shop and a machinist who gives half his time to construction and repair work.



SECOND FLOOR PLAN

FIRST FLOOR PLAN

ELECTRICAL LABORATORY.

Columbus and neighboring towns have many electrical plants of different systems which welcome visiting students. It is also usual to make an inspection trip to one or more of the cities of the State to visit manufacturing establishments and other points of electrical interest.

The Electrical Hall was built in 1889 by a special appropriation of the Legsliature, and is occupied entirely by the Department of Electrical Engineering. It is a two-story brick building about seventyfive by fortyfive feet. In the first floor, sixty feet are taken up by the dynamo room, which is well lighted and has an asphalt floor, laid on concrete. The remainder of the floor is occupied with an office and apparatus room, a shop, a dark room for photography and a calibrating room arranged for the accurate and easy standardization of the instruments used in the laboratory. On the second floor are a lecture and draughting room 45 by 30 feet, a reading room and library, office, photometric, magnetic and telephone laboratories, locker room and janitor's room. The building and its equipments are valued at about fifteen thousand dollars.

6. **Electrical Engineering.** Lectures on direct and alternating circuits, dynamo machinery, transformers, accumulators and their applications. Twice a week. (First and Second Terms, third year, Course in Architecture; and fourth year, Courses in Civil, Mechanical and Mining Engineering, Industrial Arts and Manual Training.)

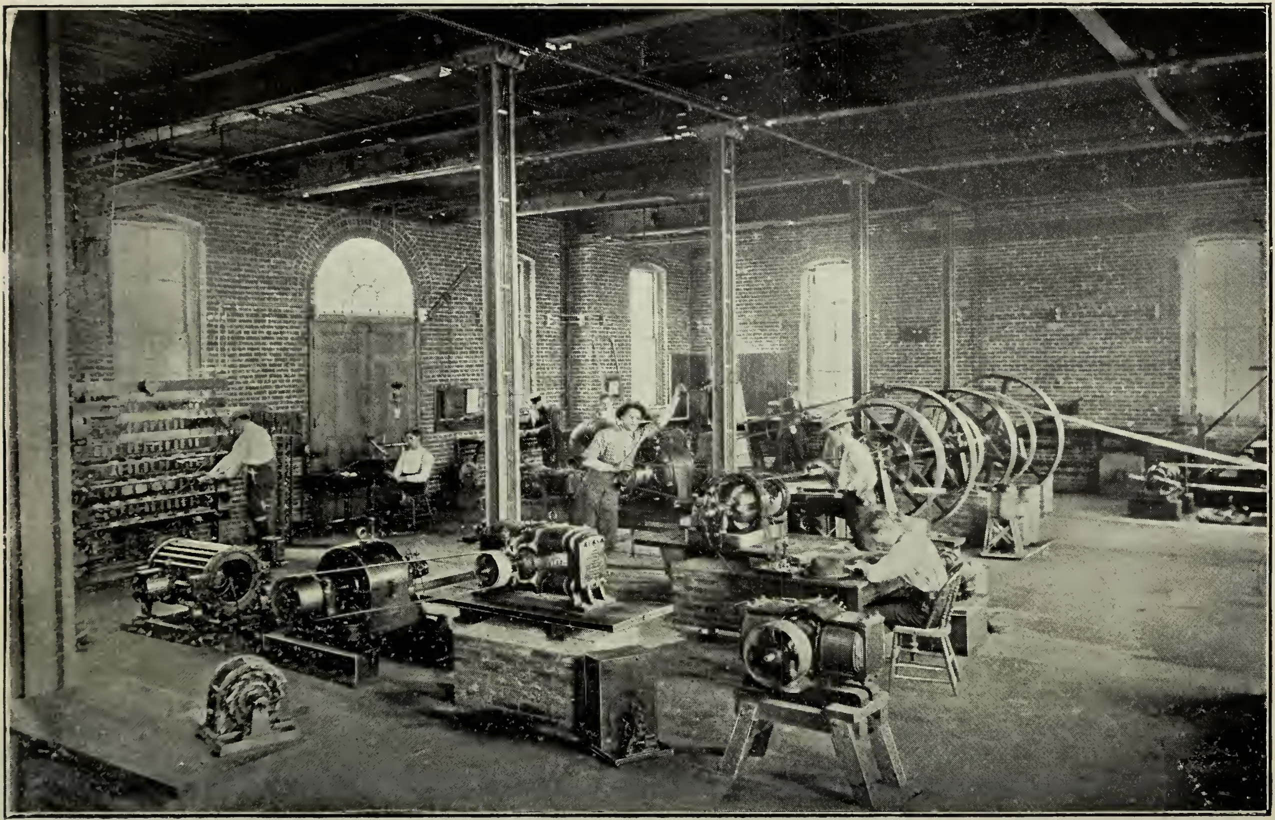
7. **Electrical Engineering.** Laboratory work on the subjects treated in Course 6, which it accompanies. Twice a week. (First and Second Terms, fourth year, Courses in Industrial Arts, Manual Training, Mining and Mechanical Engineering; Second Term, third year, Course in Architecture; fourth year, Civil Engineering.)

8. **Direct Current Dynamo Machinery.** Generators and motors, their theory, construction and operation. Lectures, recitations and problems. Four times a week. (Second Term, third year, Course in Electrical Engineering.)

9. **Elementary Dynamo Laboratory.** Handling and testing of circuits, generators, motors, accumulators, lamps, etc. Nine actual hours per week. (Third Term, third year, Course in Electrical Engineering.)

10. **Alternating Current Circuits and Machinery.** Generators, transformers, single and polyphase motors, apparatus and systems. Lectures, recitations and problems. Three times per week. (First and Second Terms, fourth year, Course in Electrical Engineering.)

11. **Advanced Dynamo Laboratory.** Continuation of the work begun in Course 9, together with alternate current apparatus, telephone apparatus, etc. (First and Second Terms, six actual hours. Third



ELECTRICAL LABORATORY

Term, with thesis work nine actual hours. Fourth year, Course in Electrical Engineering.)

12. **Electrical Transmission and Distribution.** Systems, operation and apparatus. Twice a week. (Second Term, fourth year, Course in Electrical Engineering.)

13. **Application of Electricity.** Brief treatment of the elements of illumination, street railway work, telephone, telegraph, electro-metallurgy, mining, etc. The seminary method is used in this course to the extent of each student writing one paper on some assigned subject, and reading the same before the class. Five times per week. (Third Term, fourth year, Course in Electrical Engineering.)

14. **Electrical Design.** Includes wiring of buildings, direct and alternate current generators, transformers, distribution, etc. Eight hours per week in the drawing room. (Second and Third Terms, fourth year, Course in Electrical Engineering.)

FRENCH

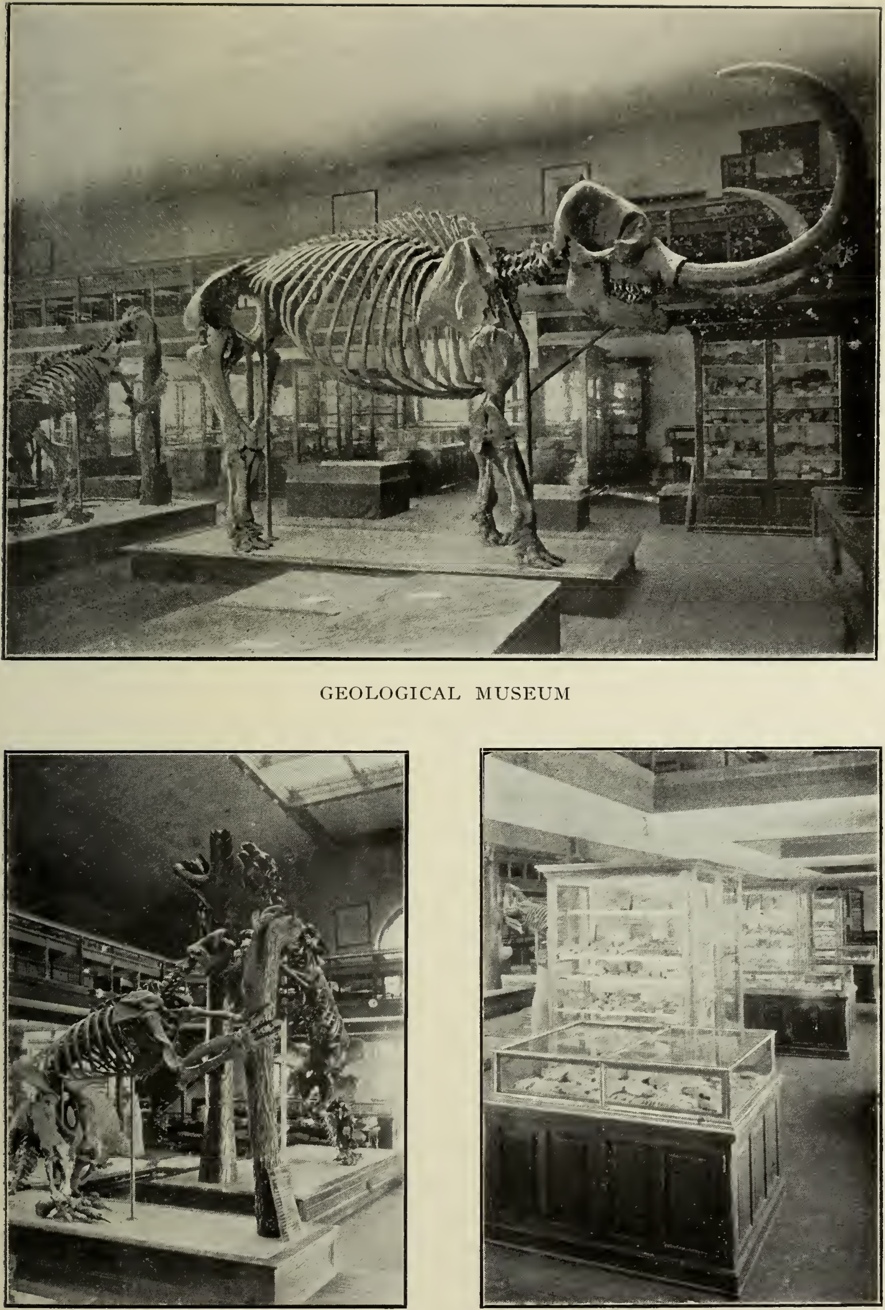
(DEPARTMENT OF ROMANCE LANGUAGES AND LITERATURES)

Office, University Hall, Room 35

Professor Bowen, Associate Professor Bruce, Mr. Jones

1. **Elementary French.** Grammar and reader, modern prose and plays. Four times a week. (First, Second and Third Terms. Required of all students who offer partial credit in French as their entrance language. Offered as alternative with German 1 and Spanish 1 to those who enter with full or partial credit in Latin, or without previous language training.)

3. **Science Reading.** Four times a week. (First, Second and Third Terms. Open to those who have completed Course 1, or its equivalent. Required of all students who offer French as their entrance language.)



GEOLOGICAL MUSEUM

GEOLOGY

Office, Orton Hall, Room 1

Professor Prosser, Professor Bownocker

The University is able to present unusual advantages for the study of Geology. By an act of the Legislature it has been put in possession of all the collections made by the late geological survey, and these collections have been supplemented by valuable additions of fossils and minerals from various sources. The State collection embraces a very complete representation of every geological formation shown in Ohio. In its new and ample quarters the Department offers exceptionally good opportunities for work in the lithological and stratigraphical laboratories.

Orton Hall, completed at a cost of more than $100,000, is designed for the permanent accommodation of the large geological collection of the University and for work and instruction in the Department of Geology. A portion of it is occupied by the library and reading room. The building is two stories in height, with a high basement, is built of brick and faced with sandstone, and is fire-proof throughout. Some of the material was contributed by various quarries of the State of Ohio, and almost all of the finer varieties of Ohio building stone are represented in the columns, walls and ceiling panels of the vestibule. At the right of the main entrance is the geological lecture room and professor's private room. The central and rear portion is occupied by the geological and paleontological museums, while the museum of economic geology is in the basement. The laboratories of lithological and stratigraphical geology are on the second floor.

1. **Physiography.** The topographic feature of the earth's surface and the agencies producing these. The atmosphere, climate, etc. Oceans, rivers, and lakes. Recitations, lectures, map work. Five hours. (Third Term, first year, Short Courses in Mining, Clay-working; and Third Term, second year, Short Course in Industrial Arts.)

2 **General Geology.** Structural, historical and dynamical geology. Three hours lectures and recitations, and four hours laboratory and field work. In the laboratory Dana's Manual of Geology, the Ohio Geological Reports and characteristic fossils will be studied. In the field, specimens will be collected, sections measured, formations identified and the student given an idea of the methods of work pursued by a field geologist. Credit five hours. (First Term, fourth year, Courses in Architecture, Ceramics, Civil and Mining Engineering; and second year, Short Course in Clay-working.)

4. **Elementary Geology.** Recitations, lectures, laboratory work. Lithological, dynamical, structural and historical geology. Five hours. (Second Term, second year, Short Course in Mining.)

6. **Economic Geology.** Lectures and assigned reading. Economic materials of stratified rocks, — clays, limes, cements, coals, iron ores, phosphates, petroleum and gas. Economic materials derived from unstratified rocks — gold, silver, copper, mercury, etc. Three hours. (Second Term, fourth year, Courses in Architecture, Ceramics, Civil and Mining Engineering; and second year, Short Course in Clay-working.)
7. **Petrography.** Lectures and laboratory work. The igneous, sedimentary, and metamorphic rocks, — their origin and classification. The volcanic rocks of the western United States, — their composition, structure and alteration products. The object of this course is to give the student a practical acquaintance with rocks. Two hours. (Second Term, fourth year, Course in Mining Engineering.)

GERMAN

(DEPARTMENT OF GERMANIC LANGUAGES AND LITERATURES)

Office, University Hall, Room 30

Professor Eggers, Associate Professor Mesloh, Mr. Eisenlohr, Mr. Moore, Miss Barrows

1. **Elementary German.** Four times a week. (First, Second and Third Terms. Required of all students who offer partial credit in German as their entrance language. Offered as alternative with French 1 and Spanish 1 to all students who enter with full or partial credit in Latin, or without previous language training.)
2. **Science Reading.** Four times a week. (First, Second and Third Terms. Open to those who have completed Course 1 or its equivalent. Required of all students who offer German as their entrance language.)

HISTORY

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE)

Office, University Hall, Room 15

Professor Knight, Mr. Tuttle

1. **Political History of the United States.** Lectures, text-books and prescribed reading. Hart's *Formation of the Union;* Wilson's *Division and Re-Union.* (Two times a week. Second Term: four times a week. Third Term, third year, Courses in Industrial Arts and Manual Training.)

INDUSTRIAL ARTS

Office, Hayes Hall, Room 2

Professor Sanborn, Mr. Knight, Mr. Renck, Mr. Crowe

The shops, which occupy the north wing of Hayes Hall, afford excellent facilities for instruction in both the practical details and the underlying principles of carpentry, pattern-making, forging, moulding, foundry work and machine work.

The carpenter and pattern shop is equipped with twenty-five benches with complete sets of carpenter tools for each and a large number of special tools for general use, twenty-three pattern-maker's turning lathes, with cupboards containing the necessary turning and pattern-making tools under each, an 8 foot pattern-maker's lathe with compound rest, a pony planer, a buzz planer, a circular rip and crosscut saw, a scroll saw, a trimmer and a power grindstone.

The forge shop is equipped with twenty stationary forges, with anvils and tools for each, a heating forge, a portable hand forge, a foot-power hammer, a blacksmith's drill and punch, shear and bar cutter. The blast for the forges is furnished through under-ground piping by a 45-inch Buffalo pressure blower, and the smoke is removed by a 55-inch Buffalo exhaust fan overhead. Both of these fans are driven by a 15 horse-power electric motor.

The foundry is equipped with a 24-inch Colliau cupola, the blast for which is furnished by a 30-inch Buffalo blower; two brass furnaces, one 16 inches in diameter and the other 20 inches in diameter; a core oven, benches for iron and brass moulding, core-making and cleaning of castings, a space for floor moulding 30 feet by 40 feet, besides all the necessary moulding tools, flasks, crucibles, ladles, tongs, etc.

The machine shop is driven by a 30 horse-power electric motor from above, and is equipped with the following tools: Twenty-eight benches for vise work, with complete sets of tools; eight speed lathes, sixteen engine lathes, a Fox monitor turret lathe, two planers, two shapers, a milling machine, an upright drill, a sensitive drill, grinding machines for both plane and cylindrical surfaces, tool grinders, emery wheels, etc. This machinery is furnished with all the necessary tools, and the tool-room is equipped with full sets of drills, taps, dies, milling cutters, standard plugs, guages, threads, micrometers and a great variety of special tools.

Hayes Hall is a large building of pressed brick and brown sandstone, completed and equipped at a cost of about $70,000. It is devoted to instruction in Industrial Arts, Drawing, Civil Engineering, Mechanical Engineering and Domestic Science. The central portion is three stories high and the front wings are two stories each. On the

INDUSTRIAL DEPARTMENT — MACHINE SHOP

first floor are two offices, the rooms of the Department of Domestic Science and two lecture rooms; besides the machine shop, the forge shop and the foundry. On the second floor are the carpenter and pattern shops, and the Department of Civil Engineering, with private rooms annexed. The Department of Drawing occupies the third floor for instruction in mechanical and free-hand drawing and photography.

1. **Tools and Machines.** Lectures and recitations on hand and machine tools and the principles underlying their construction and operation, and materials used in construction. Three times a week. (First, Second and Third Terms, third year, Courses in Industrial Arts and Manual Training; and second year, Short Course in Industrial Arts.)

2. **Designing.** Problems in design, to accompany Course 1. Three times a week. (Second and Third Terms, third year, Courses in Industrial Arts and Manual Training.)

3 **Shop Equipment, Appliances and Management.** A continuation of Course 1. Lectures and recitations on the strength and durability of the materials used in construction; shop and factory buildings and their construction; power, power transmission and prime movers; automatic machines and other special devices for turning out cheap and accurate work; methods of compensation and shop accounts and management. Three times a week. (First, Second and Third Terms, fourth year, Course in Industrial Arts.)

4. **Advanced Designing.** Problems in the design of buildings and the arrangement of machinery, line-shafting, etc., for manufacturing plants; to accompany Course 3. Three drawing periods a week. (First, Second and Third Terms, fourth year, Course in Industrial Arts.)

5. **Workshop Appliances.** Lectures and problems on the construction of shop buildings and the arrangement of machinery; power required and the means of transmission; friction in line-shafting and the efficiency of machinery; automatic machines and special shop appliances. Three times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

7. **Machine Design.** Practical application of the principles of machine design. Three periods a week. (Third Term, third year, Course in Electrical Engineering.)

MATHEMATICS

Office, University Hall, Room 45

Professor Bohannan, Associate Professor McCoard, Associate Professor Boyd, Assistant Professor Arnold, Assistant Professor Swartzel, Mr. Rasor, Mr. Travis, Mr. Moore, Mr. Davis

1. **Elementary Algebra.** Venable. Five times a week. (First Term, first year, Short Course in Clay-working.)

2. **Elementary Algebra.** Wentworth. Five times a week. (First Second and Third Terms, first year, Short Courses in Mining and Industrial Arts.)

3. **Plane Geometry.** Venable. Five times a week. (First Term, first year, Short Courses in Mining and Industrial Arts.)

3a. **Plane Geometry.** Venable. Five times a week. (Second Term, first year, Short Course in Clay-working.)

11. **Differential Equations.** Edwards. Once a week. (First Term, third year, Course in Mechanical Engineering.)

13. **Solid Geometry.** Venable. Five times a week. (Second Term, first year, Short Courses in Mining and Industrial Arts.)

14. **Plane Trigonometry.** Loney. Five times a week. (First Term, first year, all four-year Courses; Third Term, first year, Short Courses in Mining and Industrial Arts.)

15. **Analytical and Spherical Trigonmetry.** Loney, with notes on Spherical Trigonometry. Twice a week. (Second Term, first year, all four-year courses.)

16. **College Algebra.** Taylor. Three times a week. (Second Term, first year, all four-year courses.)

17. **Plane Analytics.** Loney. Five times a week. (Third Term, first year, all four-year courses.)

18. **Analytics and Differential Calculus.** Loney. Venable. Edwards. Five times a week. (First Term, second year, Courses in Architecture, Ceramics, and Civil, Electrical, Mechanical and Mining Engineering.)

19. **Differential Calculus.** Edwards. Five times a week. (Second Term, second year, same as 18.)

20. **Integral Calculus.** Edwards. Five times a week. (Third Term, second year, same as 18.)

MECHANICAL ENGINEERING

Office, Hayes Hall, Room 11

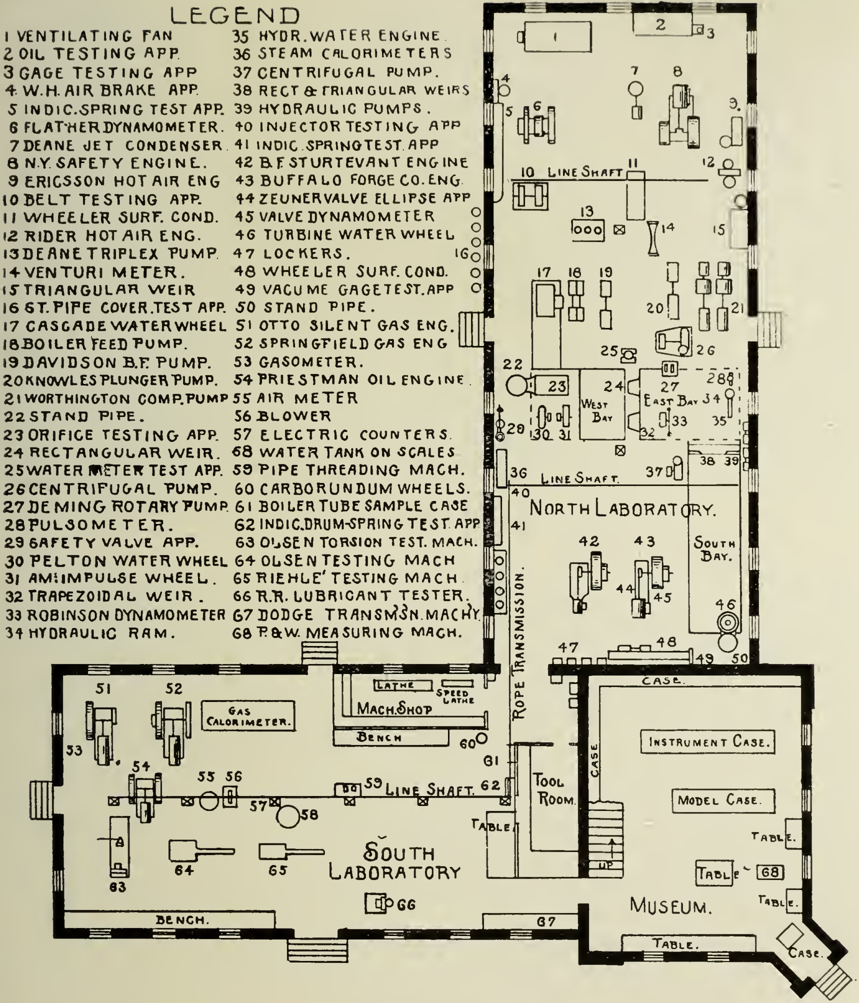
Professor Magruder, Professor Hitchcock, Mr. Frost

The lectures and recitations of this Department are held in rooms Nos. 11 and 12 of Hayes Hall, and in the lecture room of the Mechanical Hall. Mechanical Hall is a brick building, 93 feet front by 32 feet deep, with a wing 32 by 80 feet. The lecture room is on the second floor, and is also provided with drawing tables. The main floor has three large rooms. The Museum is fitted with glass cases for delicate apparatus, measuring machines and other instruments of precision, samples of engineering supplies and specimens of materials which have been tested and broken either in the laboratory or in practice; and also a collection of models of mechanisms and valve gears.

The south laboratory is used for applied mechanics and for gas engineering. Here are located the machines for testing the strength and elasticity of engineering materials, and recording their physical properties automatically and autographically. Oils are tested as lubricants.

The gas engine plant has three engines, using gas, gasoline or oil. These illustrate three methods of ignition, and fly ball and inertia governors. The air may be supplied by a fan through a large meter. Temperatures and pressures of air, gas and water are measured. The fresh and burnt gases are analyzed and their heating values determined by a calorimeter. The power is measured with both the indicator and the brake. The laboratory machine shop and tool room are in this room.

The north laboratory is used as a steam engineering and hydraulic laboratory. Three 35-horse-power engines give facilities for testing single or twin, condensing or non-condensing, simple or compound, throttling or automatic cut-off, engines using either a jet or a surface condenser. Pressure and vacuum gauges are calibrated. Indicator springs of five makers are tested both cold and hot. Five kinds of calorimeters determine the moisture in steam before and after passing three different separators. Injectors are tested for lift, quantity, pressure and steam consumption. Simple and compound steam pumps of six makes (ranging to 1200 gallons per minute capacity), two centrifugal, a triplex power and a rotary pump, are available for testing. They deliver water at pressures up to 150 pounds to two stand-pipes. These in turn supply turbine, Cascade, Pelton and American impulse water wheels, and also enable experiments to be made on the flow of water through orifices, pipes, valves, etc. Three cisterns, provided with a variety of weirs up to five feet wide, give practice in measuring flowing water. A Venturi meter and Pilot tubes are also used. Ericsson and Rider



LEGEND

1 VENTILATING FAN
2 OIL TESTING APP.
3 GAGE TESTING APP
4 W.H. AIR BRAKE APP.
5 INDIC. SPRING TEST APP.
6 FLATHER DYNAMOMETER.
7 DEANE JET CONDENSER
8 N.Y. SAFETY ENGINE.
9 ERICSSON HOT AIR ENG
10 BELT TESTING APP.
11 WHEELER SURF. COND.
12 RIDER HOT AIR ENG.
13 DEANE TRIPLEX PUMP.
14 VENTURI METER.
15 TRIANGULAR WEIR
16 ST. PIPE COVER. TEST APP.
17 CASCADE WATER WHEEL
18 BOILER FEED PUMP.
19 DAVIDSON B.F. PUMP.
20 KNOWLES PLUNGER PUMP.
21 WORTHINGTON COMP. PUMP
22 STAND PIPE.
23 ORIFICE TESTING APP.
24 RECTANGULAR WEIR.
25 WATER METER TEST APP.
26 CENTRIFUGAL PUMP.
27 DEMING ROTARY PUMP.
28 PULSOMETER.
29 SAFETY VALVE APP.
30 PELTON WATER WHEEL
31 AM. IMPULSE WHEEL.
32 TRAPEZOIDAL WEIR.
33 ROBINSON DYNAMOMETER
34 HYDRAULIC RAM.
35 HYDR. WATER ENGINE.
36 STEAM CALORIMETERS
37 CENTRIFUGAL PUMP.
38 RECT & TRIANGULAR WEIRS
39 HYDRAULIC PUMPS.
40 INJECTOR TESTING APP
41 INDIC. SPRING TEST. APP
42 B.F. STURTEVANT ENGINE
43 BUFFALO FORGE CO. ENG.
44 ZEUNER VALVE ELLIPSE APP
45 VALVE DYNAMOMETER
46 TURBINE WATER WHEEL
47 LOCKERS.
48 WHEELER SURF. COND.
49 VACUME GAGE TEST. APP
50 STAND PIPE.
51 OTTO SILENT GAS ENG.
52 SPRINGFIELD GAS ENG
53 GASOMETER.
54 PRIESTMAN OIL ENGINE.
55 AIR METER
56 BLOWER
57 ELECTRIC COUNTERS.
68 WATER TANK ON SCALES
59 PIPE THREADING MACH.
60 CARBORUNDUM WHEELS.
61 BOILER TUBE SAMPLE CASE
62 INDIC. DRUM-SPRING TEST APP
63 OLSEN TORSION TEST. MACH.
64 OLSEN TESTING MACH
65 RIEHLE' TESTING MACH.
66 R.R. LUBRICANT TESTER.
67 DODGE TRANSMSN. MACHY.
68 P. & W. MEASURING MACH.

GROUND PLAN
OF
EXPERIMENTAL ENGINEERING LABORATORY.

hot air engines are tested. A Rife hydraulic engine, a Humphryes ram, Gem and Eureka water motors, and a pulsometer, are included in the hydraulic apparatus, all of which are connected and prepared for complete tests.

A complete set of Westinghouse air-brake apparatus, a blower and a ventilating fan, enable experiments to be performed in the flow of air, which are supplemented by tests of the heating and ventilating plants in the buildings on the campus. Belts and pulleys are tested for their slippage, friction and horse-power transmitted.

The Robinson experiment boiler (for full description see page 98) gives unexcelled facilities both for laboratory exercises in the use, care and testing of steam boilers, and for the solution of original problems in this branch of enginering practice and research.

In addition to the apparatus and equipment of the power plant of the University (for description see page 96), the power house at Townshend Hall contains a horizontal, return tubular boiler, two steam engines and a 6-ton ammonia compression refrigerating machine fitted up with thermometers and an ammonia meter, and prepared for making complete tests, thereby making the facilities on the campus for engineering testing quite complete. Machinery, apparatus and appliances are continually being presented, built or purchased, and the student is given an opportunity to test everything under the practical conditions of operation. Besides the laboratory facilities, opportunities frequently arise to test machinery, engines or boilers in the city, and in these tests the students take part.

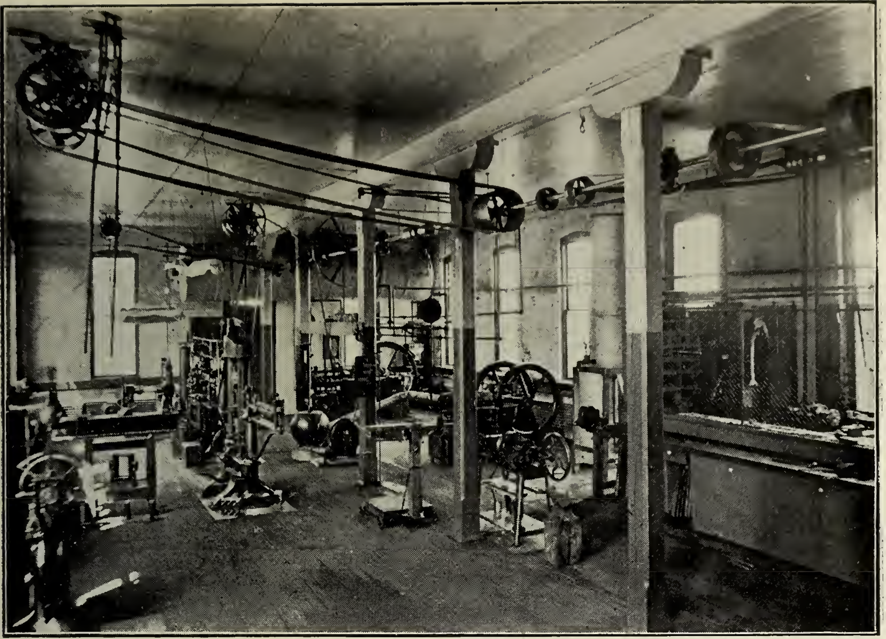
3. **Mechanism.** Lectures and recitations on the principles of mechanism and mechanical movements. Five times a week. (Second Term, third year, Electrical and Mechanical Engineering Courses.)
   The accurate laying out of movements, embodying the principles of mechanism. Twice a week. (Third Term, third year, Course in Mechanical Engineering.)

6. **Analytical Mechanics.** Five times a week. (First and Second Terms, third year, Courses in Architecture, Ceramics, and Civil, Electrical, Mechanical and Mining Engineering.)

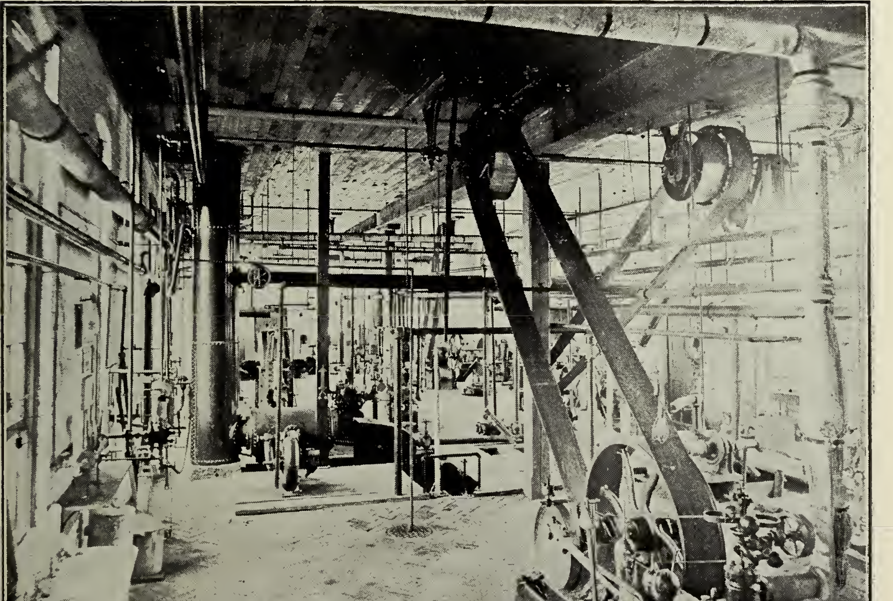
7. **Strength of Materials.** Recitations and lectures on the elastic and ultimate resistance of the materials of engineering to stress and their use in structures and machines. Lectures on elementary hydraulics and the flow of water through orifices and pipes, over weirs, and in streams, and on measuring the same. Five times a week. (Third Term, third year, same as 6.)

12. **Experimental Engineering Laboratory.** Twice a week. (First Term, third year, Course in Mechanical Engineering.)

14. The same. Four times a week. (Second Term, fourth year, Course in Mechanical Engineering.)



EXPERIMENTAL ENGINEERING LABORATORY
GAS ENGINES AND TESTING APPARATUS



EXPERIMENTAL ENGINEERING LABORATORY
STEAM ENGINES AND HYDRAULIC MACHINES

15. The same. Three times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

17. The same. Three times a week. (Second Term, fourth year, Course in Civil Engineering.)

Courses 12, 14, 15, 17, 24, 25, 27, 28, 29 and 30 in the Experimental Engineering Laboratory, are arranged to meet the needs of the different students in obtaining experimental practice in the use and calibration of accurate measuring instruments; in testing illuminating and lubricating oils for friction, endurance, and the like; in the calibration and adjustment of gauges and springs; in testing the strength and elasticity of the materials of construction in tension, compression, torsion, flexure, shear and impact, in the flow of liquids and gases; in the use of the steam engine indicator and transmission and absorption dynamometers; in testing of steam separators, injectors, steam pipe coverings; belt, rope and chain gearing; in setting valves and eccentrics; in making efficiency tests of simple and compound, condensing and non-condensing steam engines; of steam boilers and complete power plants; of gas and hot air furnaces; of pulsometer, steam, and centrifugal pumps; of hydraulic rams and of impulse and turbine water wheels.

18. **Machine Design.** Recitations on Unwin's Machine Design, with lectures on American practice. Five times a week. (First and Second Terms, fourth year, Course in Mechanical Engineering.)

19. **Machine Design.** Practical applications of the principles of machine design. Five drawing periods a week. (Third Term, fourth year, Course in Mechanical Engineering.)

21. **Thesis Work.** Five times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

22. **Timber and Masonry.** Lectures on the construction of foundations and structures in timber and masonry. Five times a week. (The last three-fifths of Second Term, third year, Courses in Mechanical Engineering and Industrial Arts.)

23. **Materials of Construction.** Lectures on the materials used in architectural and building construction, and laboratory exercises on their properties. Four times a week. (First Term, fourth year, Course in Architecture.)

24. **Experimental Engineering Laboratory.** Three times a week. (First and Second Terms. Elective to third and fourth year engineers.)

25. The same. Five times a week. (Third Term, fourth year, Courses in Ceramics and Civil and Mining Engineering.)

27. The same. Five times a week. (First term, fourth year, Course in Mechanical Engineering.)

28. The same. Twice a week. (Third Term, third year, Course in Electrical Engineering; First Term, fourth year, Course in Industrial Arts; and Third Term, Course in Manual Training.)

29. The same. Three times a week. (First Term, fourth year, Course in Electrical Engineering.) Twice a week. (Second Term, fourth year, Course in Industrial Arts.)

30. The same. Twice a week. (Second Term, fourth year, Course in Electrical Engineering; Third Term, fourth year, Course in Industrial Arts.)

31. **Hydraulic Machinery.** Recitations and lectures on pumping machinery. Three times a week. (Third Term, fourth year, Course in Mechanical Engineering.)

32. **Mechanical Engineering of Power Plants.** A descriptive study of steam and gas engines, boilers, pumps, injectors and other machinery used in plants generating power. Five times a week. (Third Term, third year, Courses in Electrical and Mechanical Engineering and Industrial Arts. Third Term, fourth year, Courses in Manual Training.

33. **Steam Engines and Boilers.** A detail study of steam using and steam generating machinery. Five times a week. (First Term, fourth year, Courses in Electrical and Mechanical Engineering.)

34. **Thermodynamics.** Lectures and recitations on the transmutations of heat and mechanical energies in steam, gas and air engines, and in air and ammonia compressors, together with a study of the tests of ideal and actual engines and of their indicator diagrams; the flow of gases through pipes and orifices. Five times a week. (Second Term, fourth year, Course in Mechanical Engineering.)

METALLURGY

(DEPARTMENT OF METALLURGY AND MINERALOGY)

Office, Chemical Hall, Room 5

Professor N. W. Lord, Mr. Somermier, Mr. Ford

The Department of Metallurgy and Mineralogy occupies the eastern part of Chemical Hall. In the basement are the smelting furnaces, the assay laboratory, a room for rough work, and store rooms for supplies. On the first floor is the lecture room of the professor in charge, a laboratory with desks for sixteen students, a store room, a balance room, a private laboratory and an office.

The metallurgical laboratory has all the appliances for the most modern methods of technical analysis as practiced in iron and steel laboratories, including gas analysis. A large room in the basement is fitted for gold and silver assaying, with improved muffle and melting furnaces, sampling apparatus and assay balances.

The lecture room in metallurgy has a projection lantern with a large collection of views of machines, mines, and furnaces. There is a photographic room with blue-printing facilities, where students learn to make copies of the drawings used in illustrating the lectures.

A collection of minerals and rocks with a large set of rock sections is provided for illustrating the mineralogy, as well as sets of blow-pipe apparatus for the students in determinative mineralogy.

2. **Mineralogy.** Lectures arranged so as to be preparatory to Determinative Mineralogy (Course 3). Three times a week. (Third Term, second year, Courses in Chemistry and Mining Engineering, and third year, Course in Ceramics.)

3. **Determinative Mineralogy.** Laboratory Course in practical determination of minerals by physical and chemical tests. Each student is furnished with a set of apparatus, and works under an instructor's inspection. Brush's Determinative Mineralogy is used as a manual. Five times a week. (Third Term, third year, Course in Mining Engineering.)

4. **Metallurgy.** A course of lectures upon fuel and its uses, iron and steel, copper, lead, gold and silver, their properties, tests, ores and details of the models of reduction. The lectures are supplemented by a careful study of references to standard works and journals. Five times a week. (First and Second Terms, third year, Courses in Mechanical and Mining Engineering and Industrial Arts; and fourth year, Course in Chemistry. First Term, fourth year, Course in Ceramics.)

ASSAY LABORATORY

5. **Metallurgical Laboratory.** Lectures and laboratory work. Laboratory practice in the analysis of iron and steel, fuel and slags, and the assay of lead, copper and zinc ores by wet methods, using approved methods as practiced in technical laboratories of metallurgical works. Course 5 must be preceded by Chemistry 7. Five laboratory periods a week. (First, Second and Third Terms, second year, Course in Mining Engineering; First and Third Terms, third year, Course in Chemistry.)

6. **Assaying.** Laboratory work. Practical work in the assaying of gold, silver and lead ores, by furnace methods. Five laboratory periods a week. (Second Term, third year, Course in Mining Engineering and Chemistry.)

7. **Metallurgical Construction.** Practice in the designing of furnaces and other metallurgical machinery, including detail drawings and estimates. Three times a week. (Second Term, fourth year, Course in Mining Engineering.)

8. **Ore Dressing and Coal Washing.** Lectures. Instruction in the methods of concentrating and enriching ores and fuels by mechanical means. Lectures with reference to standard books and various papers in technical journals. Twice a week. (First Term, fourth year, Course in Mining Engineering.)

9. **Mineral Chemistry.** Lectures upon fire-damp, mine explosions, explosives, boiler waters, poisonous gases, iron ores; iron and steel, their properties and modes of manufacture; coal and coke. Five hours a week. (Third Term, second year, Short Course in Mining.)

MILITARY SCIENCE AND TACTICS

Office, Armory Room

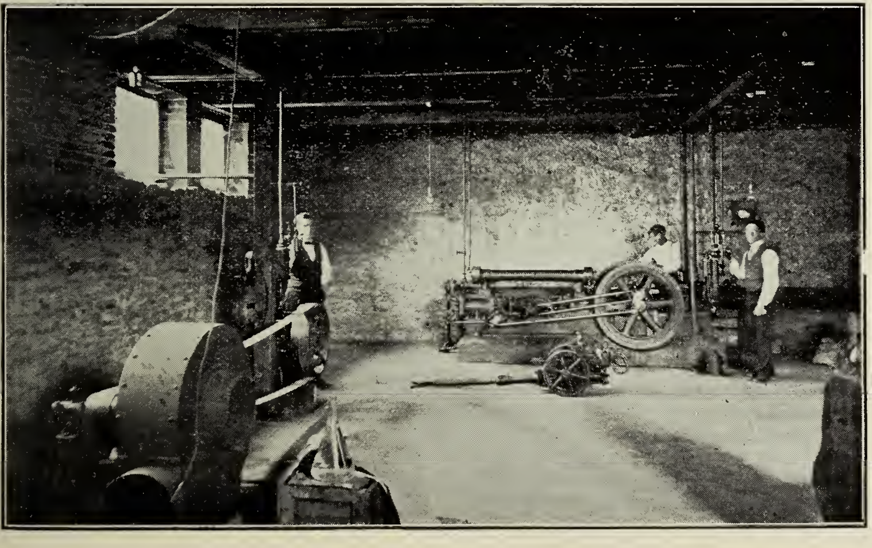
Captain George L. Converse, U. S. A.

1. **Military Drill.** Four times a week, from the opening of College till the Thanksgiving vacation; twice a week from Thanksgiving till April first; four times a week till the close of the school year. Required of all able-bodied male students during first and second years of their course.

2. **Tactics.** Lectures and recitations. Twice a week. (Second Term.)

3. **Art of War.** Lectures and recitations. Twice a week. (Second Term.)

LABORATORY FOR METALLURGICAL CHEMISTRY



MINING ENGINEERING LABORATORY—FANS AND COMPRESSOR

MINE ENGINEERING

Office, Chemical Hall, Room 29

Professor Ray

This Department is equipped with all of the latest improved instruments and apparatus used in mine engineering, surveying and the study of mine ventilation. There is a collection of models of mine machinery and supplies, to which additions are being made which are valuable as illustrations. The draughting room is large, well lighted and provided with a desk for each student, where he is personally taught map making and the platting of actual surface and underground surveys; the making of tracings of drawings, and how to make blue-prints. He is also taught proper methods of keeping notes and all records necessary to an efficient engineer's office. The students are given practical experience by making actual surveys of coal mines and in working up their notes complete in all of the necessary details. The students are also taught how to make working drawings, plans, estimates and specifications of mining operations and equipment.

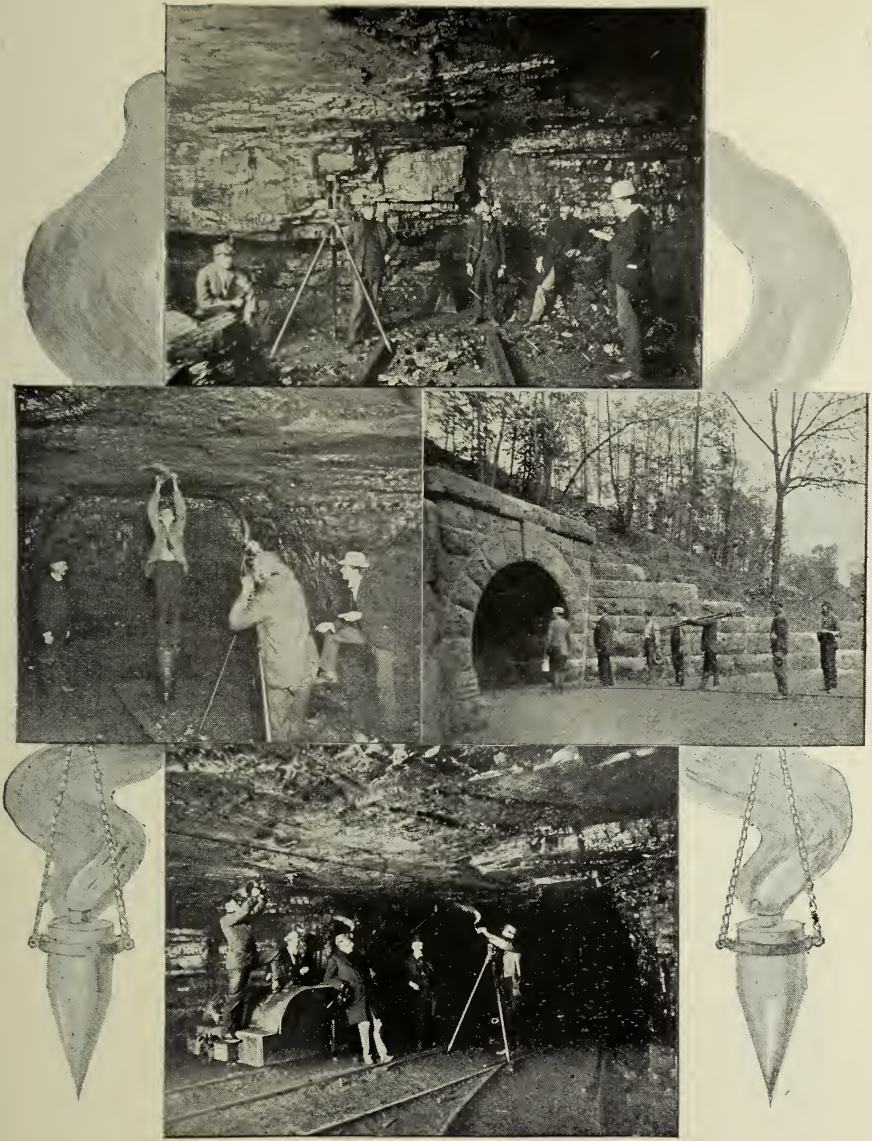
There is a large collection of views of machines, mines and mine equipment for use in the projection lantern in the lecture room. A photographic room with blue-printing facilities is used by the students in making copies of their own drawings and those illustrating the lectures.

The Mining Engineering Course pays special attention to underground surveying, mapping, timbering, ventilation and other matters relating to safety and speed, system and method in extracting coal and other minerals.

The coal mines of central Ohio are easily accessible to the University and furnish an extremely valuable field for illustrating the practical systems and methods of mine surveying, systems of mining, timbering, haulage, drainage and ventilation, tipple construction and general arrangement of mining plants.

During their course the mining students are required to make frequent trips and to spend sufficient time at the mines in actual work and observation to become familiar with practical mine surveying and the details of mine equipment and management. This work is further supplemented by visits to shops or public works, which afford practical illustrations of engineering work in the process of construction.

1. **Mine Surveying.** Lectures and field practice. This is similar to Course 4, but more elementary. The same text is used. The students have more practice in the drawing room. Five times a week. (First Term, second year, Short Course in Mining.)



CLASS IN MINING ENGINEERING AT WORK SURVEYING IN COAL MINE

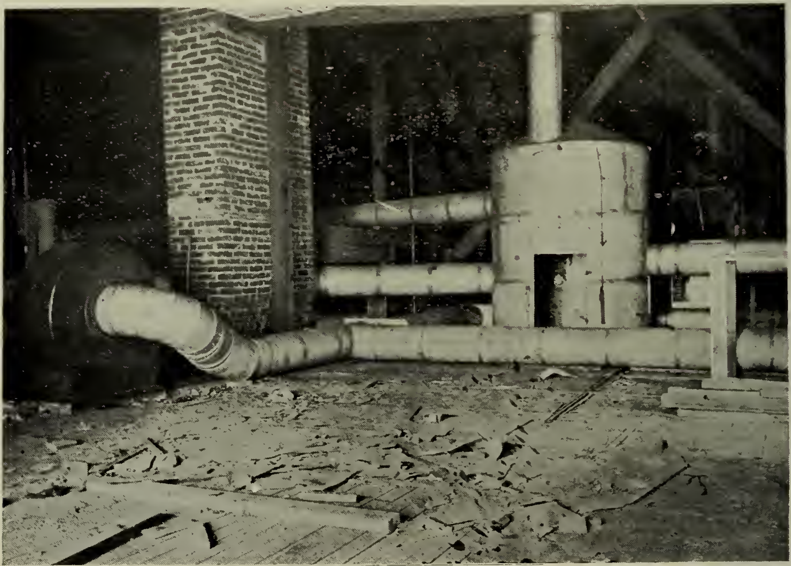
2. **Ventilation and Haulage.** Lectures illustrated by experiments and maps of mines and models when possible, tests by safety lamps and anemometers, and methods of air distribution in coal mines. Five times a week. (Second Term, second year, Short Course in Mining.)

3. **Mine Operating.** A course of lectures and practical instruction in mine book-keeping and accounts, cost of working, etc., particularly adapted to Ohio coal mining. Five times a week. (Third Term, second year, Short Course in Mining.)

4. **Mine Surveying.** Field practice in the use of instruments for surface and underground surveys. Full notes are taken and maps and plans made in the drawing room. Davies's Surveying, by Van Amringe, is used as a text-book. Five times a week. (First Term, third year, Courses in Mining Engineering and Ceramics.)

5. **Mine Engineering.** Lectures. Mine operating, mining machinery, ventilation, shaft-sinking, working out deposits, etc. Constant reference is required to the standard works and to the leading technical journals, with practice in designing mine plants, draughting and estimates. Five times a week. (First, Second and Third Terms, fourth year, Course in Mining Engineering.)

6. **Plans and Specifications.** Five times a week. (Third Term, fourth year, Course in Mining Engineering.)



APPARATUS FOR MEASUREMENTS IN VENTILATION.

PHYSICS

Office, University Hall, Room 13

Professor Thomas, Mr. Kester, Mr. Brooks

The Department of Physics occupies the west half of the first two floors and basement of University Hall. The first floor rooms are the principal lecture room, fifty-five by thirty-eight feet; the elementary lecture room; an instrument room; and the office of the Department.

On the second floor are rooms for elementary laboratory work, and a dark room for photographic work, in connection with spectrum and Roentgen-ray apparatus. The lecture room on the first floor is also used in laboratory work. In the basement, provision is made for advanced exercises in electricity, heat, etc. The basement plan on an adjoining page gives a general idea of its arrangement, and of the character of the work provided for.

The Department has an excellent equipment of apparatus, to which additions are constantly being made. The apparatus includes a large collection of pieces for illustration of the general lecture room work, but is principally chosen for accurate measurement in the laboratory. A set of standards of length, capacity and mass, sent under the act of Congress supplying such sets to the several agricultural colleges, is in the possession of the Department. The pieces are copies of the United States standards made by the Coast Survey at Washington.

Among the principal pieces of apparatus are a dividing machine by Fauth & Co.; chronometers by Parkinson & Frodsham and by Negus, the latter a break-circuit; a chronograph by Fauth & Co.; a Hipp's chronoscope; cathetometers by Salleron and by the Geneva Society, the latter an exceptionally fine instrument; Regnault's apparatus for vapor tension, for expansion of gases and for specific heat; Melloni-Tyndall apparatus for radiant heat; standard thermometers by Baudin and others; Rutherford and Rowland diffraction gratings; Rowland's spectrum photographs, spectroscopes by Brashear, Browning, Apps and others; Salleron's complete apparatus for projections in polarized light; lanterns for projections by the lime light and the arc light; a variety of sound apparatus from Koenig; portable and quadrant electrometers; Kelvin galvanometers of high and low resistance; Wiedemann, Kohlrausch and other galvanometers; standard resistance coils, with Cavendish laboratory certificate; several sets of resistance coils and bridges; a Kew magnotometer; Kelvin Standard balances; Weston Ammeters and voltmeters; standards of self-induction; standard battery cells; photometric standards and photometers; X-ray apparatus, etc.

Under the laws of Ohio, the professor of Physics is ex-officio State Sealer of Weights and Measures, and all of the standard weights, measures and balances received from the United States government are in the rooms of the Department.

1. **Elementary Physics.** Recitations and experimental lectures. Five times a week. Text: Carhart & Chutes' "Elements of Physics." (First and Second Terms, first year, Short Courses in Mining and Clay-working; and second year, Short Course in Industrial Arts.)

2. **Mechanics and Heat. Electricity and Magnetism, Sound and Light.** Lectures and recitations. Three times a week. (First Second and Third Terms, second year, all four-year courses.)

3. **Physics.** Extension of Course 2, with practice in solution of problems. Twice a week. (First, Second and Third Terms, second year, Courses in Electrical Engineering, Ceramics, Industrial Arts and Manual Training.)

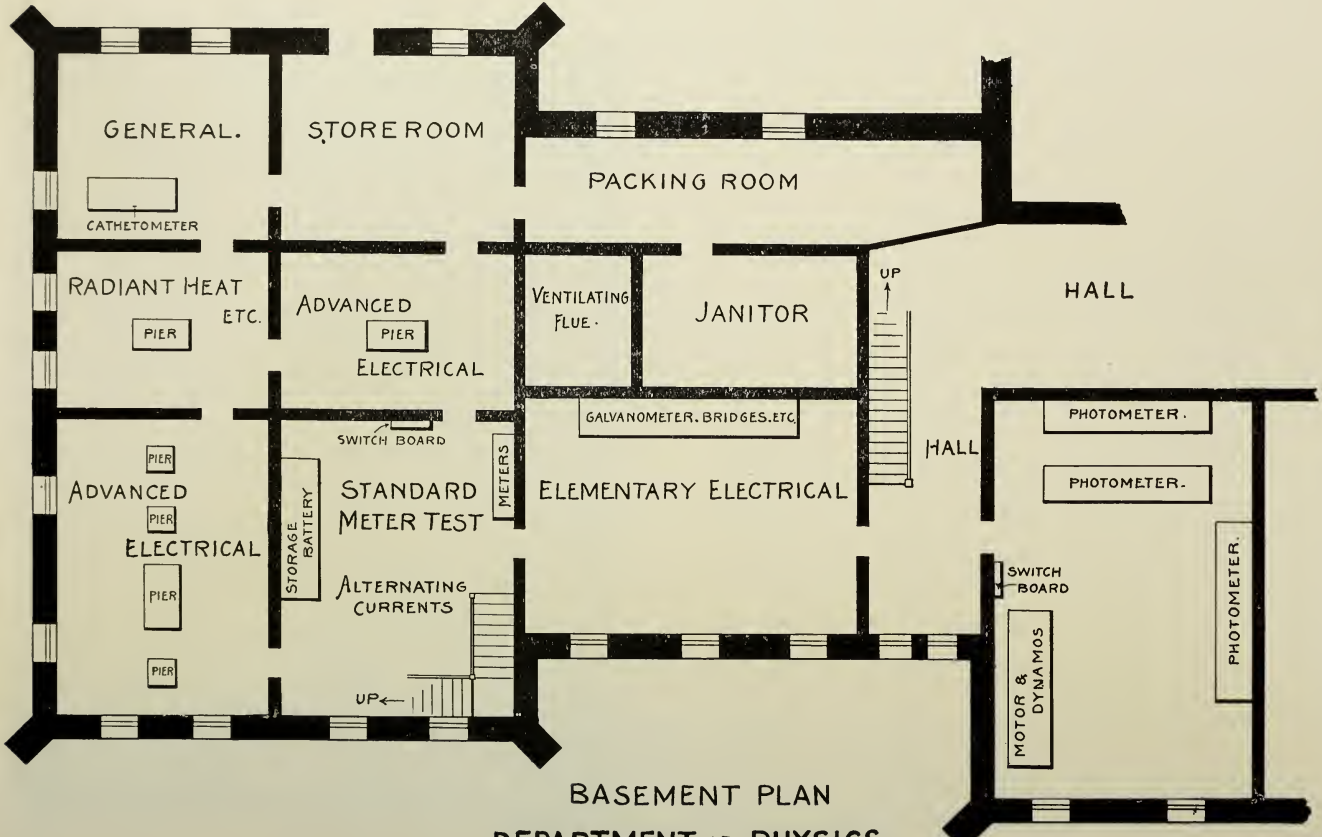
4. **Electricity and Magnetism.** Lectures and recitations. Three times a week. (First Term, third year, Course in Electrical Engineering.)

5. **Physical Laboratory.** Elementary manipulation. Length, mass and time measurements. Work in density, elasticity and in heat. Four times a week. (Third Term, second year, Course in Electrical Engineering.) (Alternative with Chemistry 20 and 21. First, Second and Third Terms, third year, Course in Manual Training.)

6. **Physical Laboratory.** Theory and practice of magnetic and electrical measurement, including the testing and standardizing of instruments; conductivity of conductors; insulation, capacity and resistance of insulated conductors and cables; temperature coefficients; commercial measuring and testing instruments; strength and distribution of magnetic fields; magnetic moments, permeability; work in light, including optical constants; spectroscopy; photometry of gas, electric and other lights. Five times a week. (First and Second Terms, third year, Course in Electrical Engineering.)

7. **Physical Laboratory.** (Twice a week, Second Term, three times a week, Third Term, second year, Course in Mechanical Engineering.) Three to five hours a week. First, Second and Third Terms, General Elective.

9. **Physical Laboratory.** A second year's work in Physical Laboratory. Three to five hours a week. Course 9 must be preceded by Course 6 or Course 7. Elective.



BASEMENT PLAN
DEPARTMENT OF PHYSICS.

VIEW IN LABORATORY FOR FIRST YEAR STUDENTS IN CHEMISTRY.

PHYSIOLOGY

(DEPARTMENT OF ANATOMY AND PHYSIOLOGY)

Office, Biological Hall, Room 12

Professor Bleile, Assistant Professor Morrey, Mr. Dresbach

8. **Bacteriology.** One lecture, one laboratory period a week. (Second Term, fourth year, Course in Chemistry.)

POLITICAL SCIENCE

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE)

Office, University Hall, Room 15

Professor Knight, Mr. Tuttle

11. **Political Institutions of the United States.** Lectures and recitations. A study of the origin and nature of the political institutions of the United States, and an analysis of the form and powers of

the government. Bryce's *American Commonwealth;* Burgess's *Political Science.* Three times a week. Open only to students who have had American History 1. (First Term, fourth year, Courses in Industrial Arts and Manual Training.)

RHETORIC

(DEPARTMENT OF RHETORIC AND ENGLISH LANGUAGE)

Office, University Hall, Room 44

Professor Denney, Assistant Professors Graves, McKnight, Allen, Mr. Bohn, Mr. Abbott

1. **Paragraph Writing and Analysis of Prose.** Twice a week. (First, Second and Third Terms, first year, all four-year courses.)
2. **Expository Writing.** Twice a week. (First Term, second year, Courses in Industrial Arts, Manual Training, and Electrical and Mechanical Engineering; third year, Courses in Architecture, Ceramics, Chemistry, and Civil and Mining Engineering.)
3. **Brief-making and Written Argumentation.** Twice a week. (Second and Third Terms, years and courses as in 2.)
10. **Advanced Composition.** Credit one hour. Three terms.
21. **Essentials of Oral Discourse.** Once a week. (First, Second and Third Terms, first year, all four-year courses.)

SPANISH

(DEPARTMENT OF ROMANCE LANGUAGES AND LITERATURES)

Office, University Hall, Room 35

Professor Bowen

1. **Elementary Spanish.** Grammar and Reader; modern stories and plays; composition and conversation. Four times a week. (First, Second and Third Terms. Offered as an alternative with French 1 and German 1 to those who enter with full or partial credit in Latin or without previous language training.)

SHOPWORK

(DEPARTMENT OF INDUSTRIAL ARTS)

Office, Hayes Hall, Room 2

Professor Sanborn, Assistant Professor Knight, Mr. Renck, Mr. Crowe

Note — For time requirements, credit given, and all similar information concerning shopwork courses, see table page 94.

3. **Foundry Work.** Exercises and practice in tempering sand and preparing moulds of machine parts in the sand, core-making, melting iron and brass and pouring castings.

4. **Chipping and Filing.** Exercises and practice in vise work, including chipping in cast and wrought iron, surface filing, squaring, fitting, finishing, and the scraping of surface plates.

7. **Carpentry and Pattern Making.** Exercises and practice in carpentry, wood-turning and pattern making, including sawing, planing, mortising, splicing, framing and other work involving the use of the ordinary carpenter tools; center and chuck turning; the making of finished patterns; and enough elementary molding to illustrate draft, parting, cores, etc.

8 **Carpentry: Cabinet Work.** Exercise and practice in cabinet making, including panelling, mitre and dovetail joints, etc.; use of power tools.

9. **Advanced Pattern Making.** Continuation of pattern work of Shopwork 7.

11. **Forging.** Exercises and practice in iron and steel forging, including such operations as drawing, bending, forming, upsetting, welding and the making and tempering of punches, drills, chisels, lathe tools, and springs.

12. **Advanced Forging.** Tool making, tempering of taps, dies, cutters, etc.; annealing; case hardening; ornamental iron work, etc.; visits to shops.

13. **Machine Work.** Exercises and practice in hand-turning in iron and brass on speed lathes; in straight and taper burning, boring, fitting, chucking, and thread-cutting on engine lathes.

14. **Machine Work.** Exercises and practice on the lathe, planer, shaper, drill press and milling machine, with use of small tools as drills, taps, dies, reamers, counterborers, etc.; construction of parts of actual machines.

INDUSTRIAL DEPARTMENT — WOODWORKING SHOP

15. **Advanced Machine Work.** Exercises and practice on turret lathe, universal, surface and tool grinding machines, gear cutting, etc.

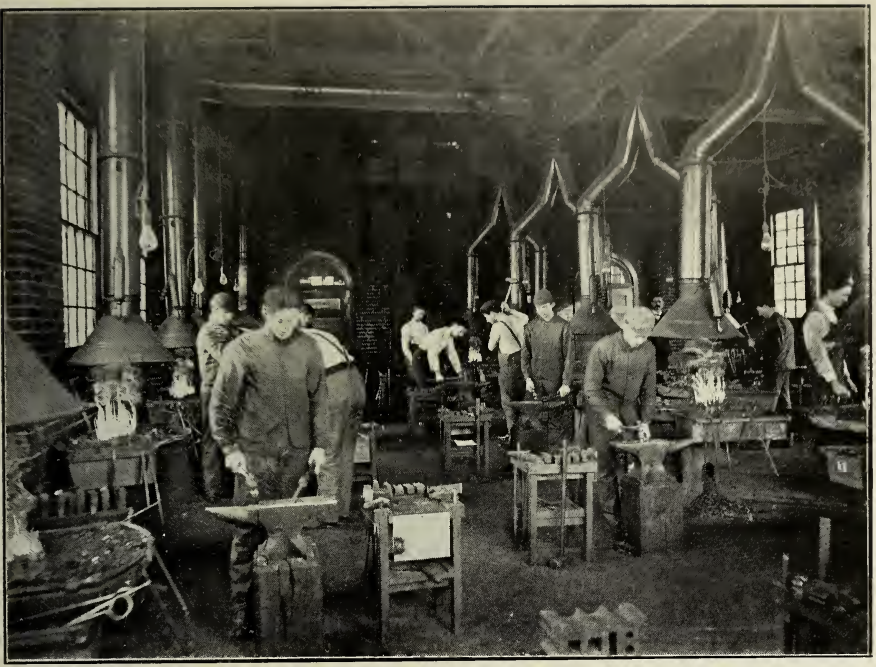
16. **Advanced Machine Work.** The construction and use of jigs and templates; the accurate laying out of work; the duplication of parts, the production of work rapidly and economically, etc.

17. **Advanced Machine Work.** The making and use of special tools and fixtures, standard plugs and collars, standard caliper and limit guages; error limits in modern machine construction; methods of testing the accuracy of machine tools, etc.

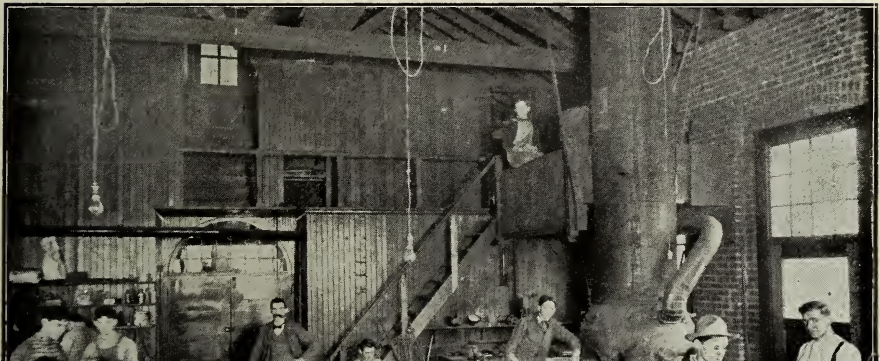
Shopwork Required.

NOTE — The present time requirements in shopwork are given in the following table, but a revision of this schedule is likely to soon be made necessary by the introduction of a summer course of four weeks.

Number	Credit	Year	Term	Courses in
3	2	2	1	M. E.: I. A. (short).
	3	2	1	I. A.: Man. Tr.
4	2	2	1	E. E.
	3	3	1	I. A.: Man. Tr.
	3	2	1	I. A. (short).
	3	2	2	M. E.
	2	1	3	Clay-w'k (short).
	3	4	1	Cer.
7	3	1	1	I. A. (short).
	3	2	1	Chem.: I. A.: Man. Tr.
	2	2	1	E. M.
	4	1	3	E. E.: M. E.
8	3	2	3	I. A.: Man. Tr.
9	3	2	2	I. A.: Man. Tr.
	3	1	2	I. A. (short).
11	2	2	1	E. E.
	3	2	1	M. E.
11	2	2	2	E. M.
	3	2	2	Chem.: I. A.: Man. Tr.
	3	1	3	Clay-w'k (short): I. A. (short).
	3	2	3	Mining (short).
	3	3	3	Cer.
12	3	2	3	I. A.: Man. Tr.
13	3	2	2	E. E.
	3	3	2	I. A.: Man. Tr.
	5	2	2	I. A. (short).
	3	2	3	M. E.
14	3	3	1	M. E.: E. E.
	3	3	3	I. A.: Man. Tr.
15	3	4	1	I. A.: Man. Tr.
	4	3	2	M. E.
	5	2	3	I. A. (short).
16	3	4	2	I. A.: Man. Tr.
17	3	4	3	I. A.



INDUSTRIAL DEPARTMENT — FORGEROOM



INDUSTRIAL DEPARTMENT — FOUNDRY

THE UNIVERSITY POWER PLANT

The buildings of the power plant were completed in 1896, and, with their contents, form a model plant. The boiler room is 38 by 100 feet, and is equipped with five 150 H. P. boilers, with Babcock and Wilcox chain grates and Murphy automatic stoker. There are also coal and ash conveyors for the whole plant. At one end of the boiler room is the coal room, and at the other the pit for the hot well, from which runs the tunnel (about three-fourths mile in length) to the buildings of the University, carrying heat, gas and water-pipes and power, light and other wires.

Near the boiler house is the power house, 40 by 60 feet. The power generating plant consists of a 70 Horse Power McEwen compound engine, belted to a 60 kilowatt 2-phase Westinghouse Alternator, and a 200 Horse Power Watertown Compound, direct connected to a 125 kilowatt 2-phase generator. These occupy the main floor, together with a complete marble switchboard, with ammeters, voltmeters, wattmeters, static ground detectors, etc. A ten-ton traveling crane is available for handling the machinery in this room.

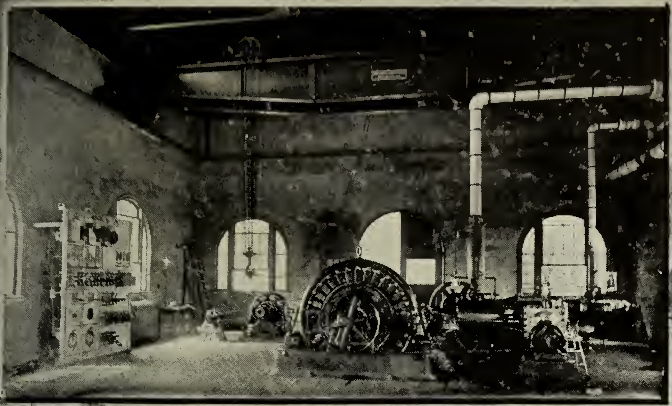
In the basement are condensers, which get their water from a large cooling reservoir at the side of the building. Here also are the transformers that convert the current to be used in the motors scattered over the campus, from 110 volts, at which it is generated, to 400 volts, at which it is transmitted.

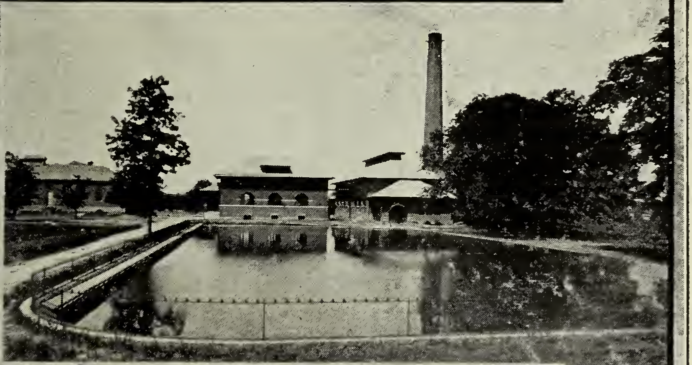
There are installed on the campus over eighteen hundred incandescent lamps, twenty-four arc lamps and about 250 H. P. in motors. The electric plant is for the most part of the Westinghouse system. The buildings are of brick. Nearly all of the University buildings are heated by steam from this plant. The total cost of the plant for generation of power, light and heat, and for its transmission to the buildings, has been something over $100,000.

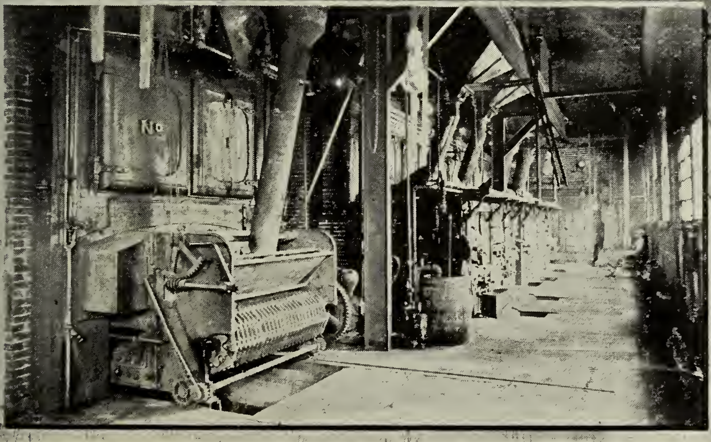
The views on the opposite page show the interiors of the engine house and boiler house above and below and in the center, a view of the whole plant, looking west across the reservoir.

During the year 1900 a very excellently equipped experimental steam boiler of 100 H. P. capacity was donated to the University by Dr. Stillman W. Robinson, Emeritus Professor of Mechanical Engineering. This boiler, one of the most complete things of the kind ever erected, has been located in the Boiler House, but belongs to the Experimental Engineering laboratory of the Department of Mechanical Engineering, and is under its supervision and control.

This gift, for the special prosecution of experimental research, adds greatly to the opportunities offered to students by the already extensive power and electric plants. A full description of it follows.







ENGINE ROOM

POWER PLANT — FROM EAST

BOILER ROOM

THE ROBINSON EXPERIMENT BOILER

In order to greatly facilitate experimental and research work in the direction of combustion of fuels under variable conditions as applied to steam generation, there was installed during the past year in the University boiler house, a most complete experiment boiler outfit. This equipment was furnished by Stillman W. Robinson, Emeritus Professor of Mechanical Engineering, who not only established the Department of Mechanical Engineering at Ohio State University and for many years was its head, but was the originator of the first Mechanical Engineering Department in this country connected with a state university, that at Champaign, Ill.

A Babcock & Wilcox boiler of 107 H. P., built for a working pressure of 200 lbs., with hand fired furnace of the oven fire-brick arch type, is the principle of the system. The products of combustion after passing the boiler can be conducted direct to the open air by the chimney or otherwise, or into a Green's fuel economizer where its 570 sq. ft. of heating surface transfers heat to the feed water on its way to the boiler. The heat of the escaping gases can still further be absorbed by an air heater having 1,330 sq. ft. of heating surface. The heat thus taken up is transmitted to the air employed in the fuel combustion.

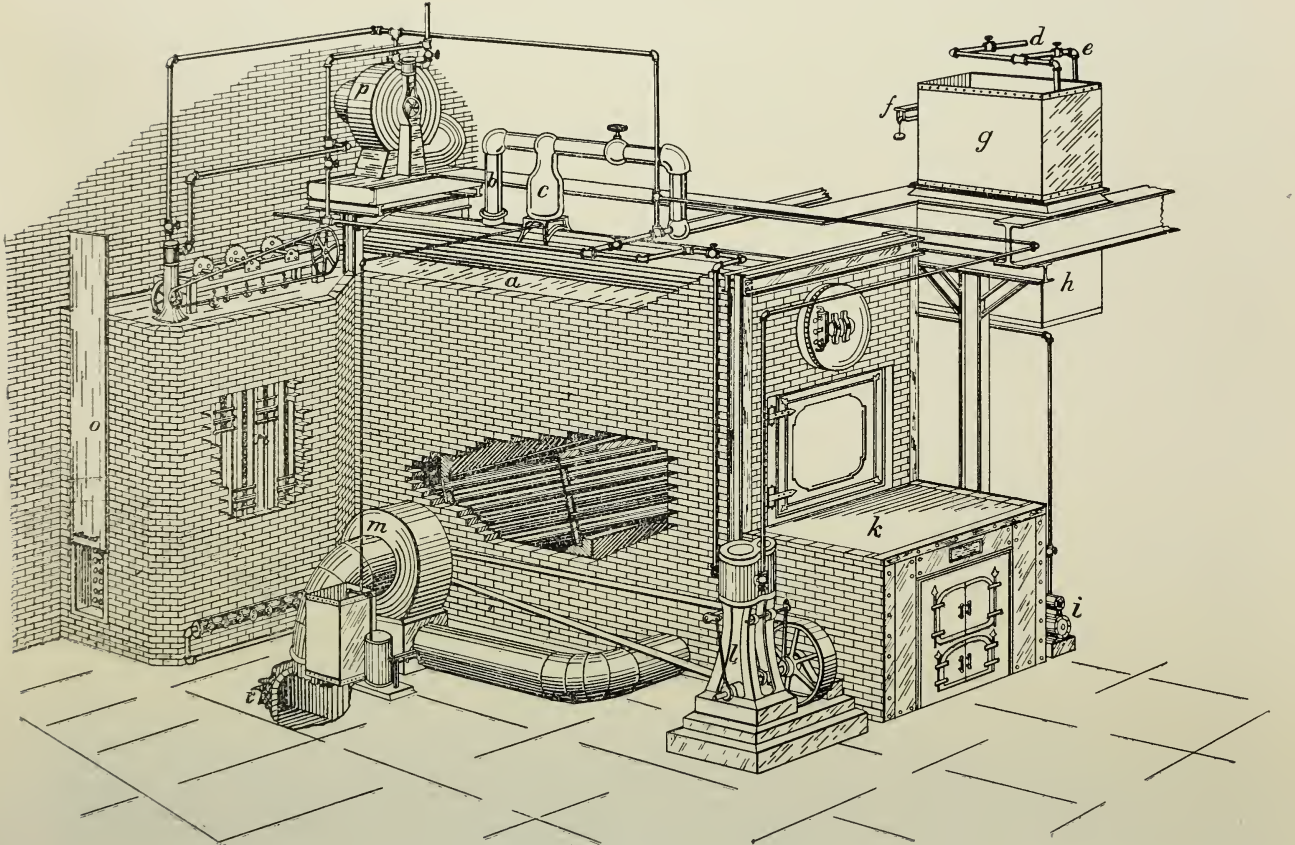
For promoting combustion, natural draft may be employed, or when greater intensity of draft is desired above that produced by the chimney, the latter can be cut out and a Sturtevant induced draft fan driven by a direct connected engine, brought into action. In combination with either mechanical induced or natural draft, forced draft produced by a belt driven Sturtevant fan, may be employed, and the air forced into the ash pit may be taken from the boiler room direct, or by a system of underground flues be compelled to pass through the air heater on its way to the fan

Weighing and collection tanks in conjunction with a steam pump supply the boiler with known quantities of water which flows by the way of the economizer or to the boiler direct. In this feed water system is a Hayden's feed water purifier with live steam heater, which may be used in conjunction with the economizer.

Draft intensity and temperatures are determined at many points throughout the system, a Le Chatelier pyrometer being used for high and mercurial pyrometers for low temperatures.

An Arndt's econometer indicates continuously the percentage of carbon dioxide in the escaping gases, while at the same time the Orsat's apparatus is used for giving absolute composition. The composition of the fuels employed and their calorific values are determined in the department of Metallurgy.

The plant as a whole admits of many combinations, thereby being able to meet almost every condition in practice.



THE ROBINSON EXPERIMENT BOILER

PHYSICAL EDUCATION

The Gymnasium is a large modern building, completed in 1898. The basement is used for lockers, dressing rooms and baths. The east end is used by the young women, the west end by the young men. Each end has separate shower and plunge baths.

The exercising floor, 80x150 feet, is thoroughly equipped with the best apparatus in duplicate. The running track is fourteen laps to the mile, with graded elevations at the curves to meet the requirements of the different rates of speed. The track is laid with felt an inch in thickness, three and a half feet wide and covered with rubber coated canvas.

The work is compulsory for the first and second year students. The course consists of theoretical and practical work in the gymnasium, and includes calisthenics, light and heavy gymnastics, physiology of exercise, physical examinations and measurements. It is intended to give the student such a training in the methods of Physical Education that he may have a comprehensive knowledge of the subject.

A thorough physical examination of each student is made in the fall, and the measurements are outlined on charts, so as to show the parts below the normal development, for which special exercises suited to the health and physical condition of each individual will be suggested. These charts are constructed from the accumulated data of several thousand measurements of college students. Experience demonstrates that the body, as well as the mind, is susceptible of right and wrong development. Every part of the body can be strengthened and increased and the relation of one part to another can also be changed so as to correct imperfections.

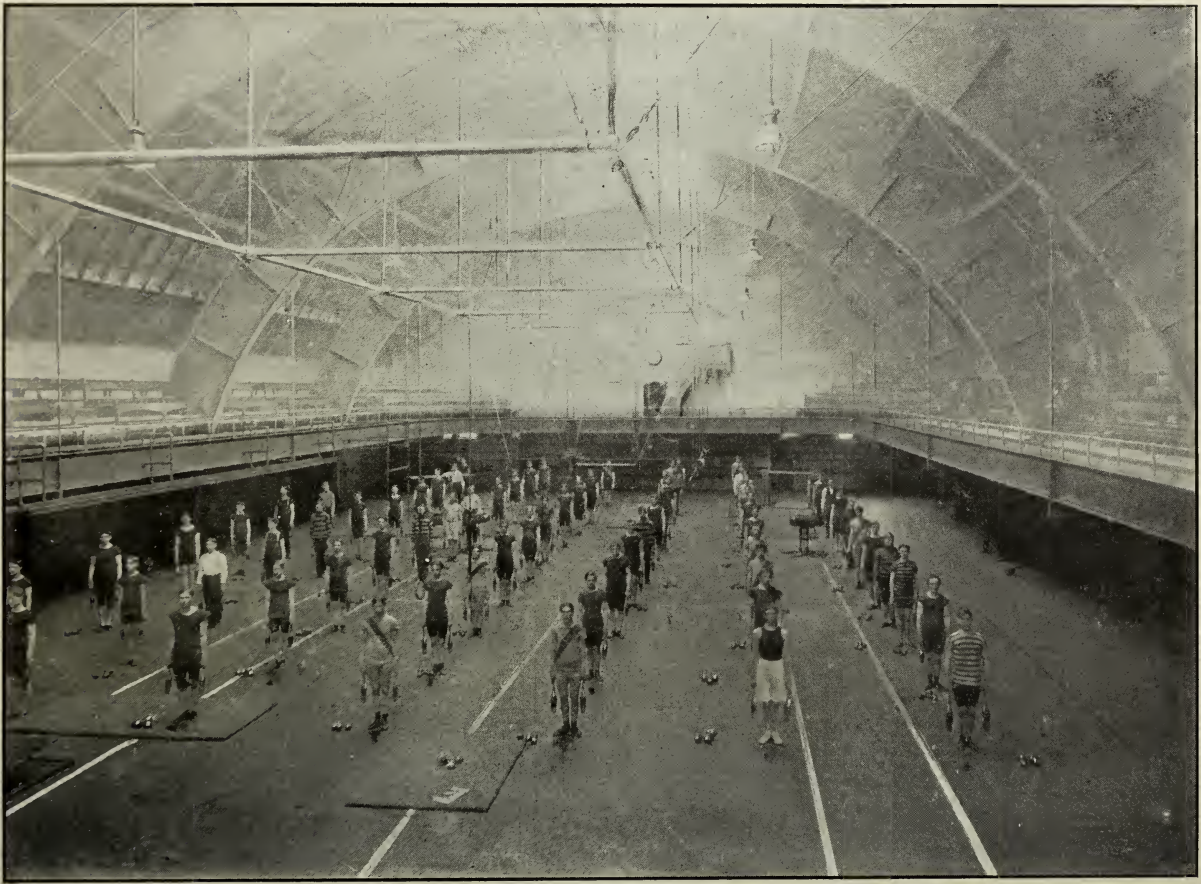
Class leaders who act as floor aids are selected from among those who show a proficiency in the work; these students are given a certificate of their appointment as Aids, and the letter A in scarlet which they are entitled to wear on their gymnasium suits.

It is the aim of the department to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Athletic Association

An important factor in the physical development of the students is the University Athletic Association, which is managed by a board made up of three members from the Faculty, three from the Alumni, and four from the student body. This board has complete charge of all intercollegiate events and does all in its power to promote base-ball, foot ball, tennis, basket ball, and track and other athletics.

The Association is in a most flourishing condition and the interest of the students generally in the matter is great and increasing. The Association has one of the finest athletic fields in this part of the country.

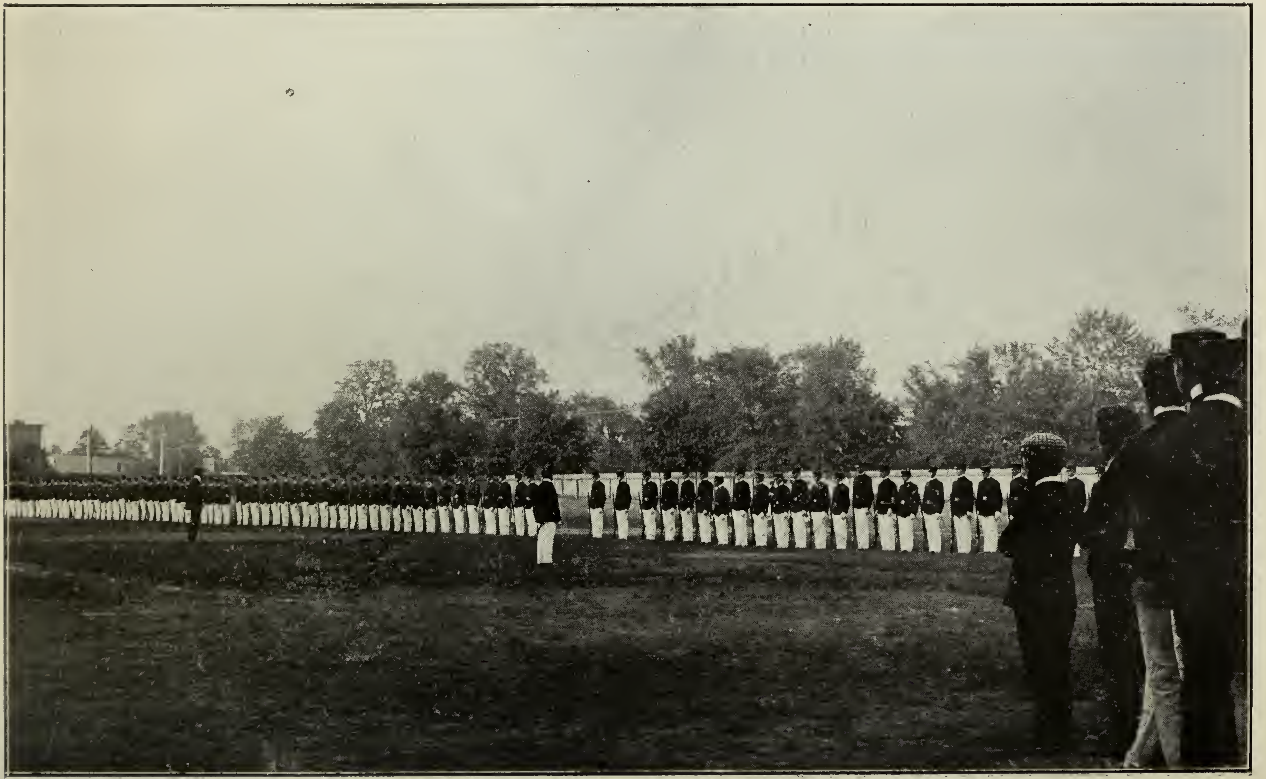


GYMNASIUM

MILITARY DRILL

The same building used as gymnasium is also employed as Armory and Drill Hall by the University Battalion. This is in charge of a Commandant from the United States Army, apart from whom it is officered entirely by the students. Since participation is required of all students during the first two years of their course, the size of the battalion is such as to make interesting manuevers possible. Besides its military importance as shown by the prominent place taken by former students among the Ohio troops sent to the late war, the great value of this work in the physical development of the students is thoroughly recognized by all educators.

The drill begins with four hours per week in the first term, which is outside, weather permitting. The fall work is largely devoted to squad drill in the setting up exercises, facings, marching, etc., and company drill according to progress of the squads. In December the drill is reduced to two hours per week during the months of December, January, February and March, with one hour additional for theoretical work. During these months drill is confined to work inside the Gymnasium, manual of arms, guard mounting and such ceremonies as can be performed within a limited space. From April 1st to the end of the term all work is outside, weather permitting, four days of each week as follows: Mondays, Company drill; Tuesdays, Battalion drill; Wednesdays, ceremonies other than guard mounting, and Thursdays, guard mounting and Company drill. During the entire year and on the same days as enumerated above, the O. S. U. Band either has its practice hour or takes part in ceremonies and drill. Similarly the Signal Corps belonging to the battalion exercises in the flag drill or at telegraph work. The battalion of cadets is modeled after a battalion of U. S. Infantry, and consists of four companies under command of a Cadet Major. Army regulations are followed strictly. The battalion for the year 1900–01 has averaged about four hundred and fifty men and officers under command of Cadet Major Kettler and Captains Morris, Scarlett, Hapgood and Neill.



CADET BATTALION ON DRESS-PARADE

STUDENT ORGANIZATIONS

Religious

One of the most commendable organizations in the University is a branch of the International Young Men's Christian Association, organized in 1883. It has a house and a large membership and steadily grows in influence. Services are held daily and weekly. New students are made cordially welcome, and young church members will here enjoy Christian influences and fellowship in college life.

Literary

There are five literary societies in the University, three of which are open to young men. These are the Alcyone Literary Society, founded in 1874, the Horton Literary Society, founded in 1875 and the Athenian Literary Society, founded in 1896. Each of these societies has commodious and well furnished apartments in University Hall. They meet weekly, and their work, offering to the student a very desirable training in composition, public speaking, and parliamentary order, is a very valuable adjunct to a collegiate education, *especially to students engaged in the technical courses*, whose prescribed work includes much less of this sort of training than is given to students in the academic lines.

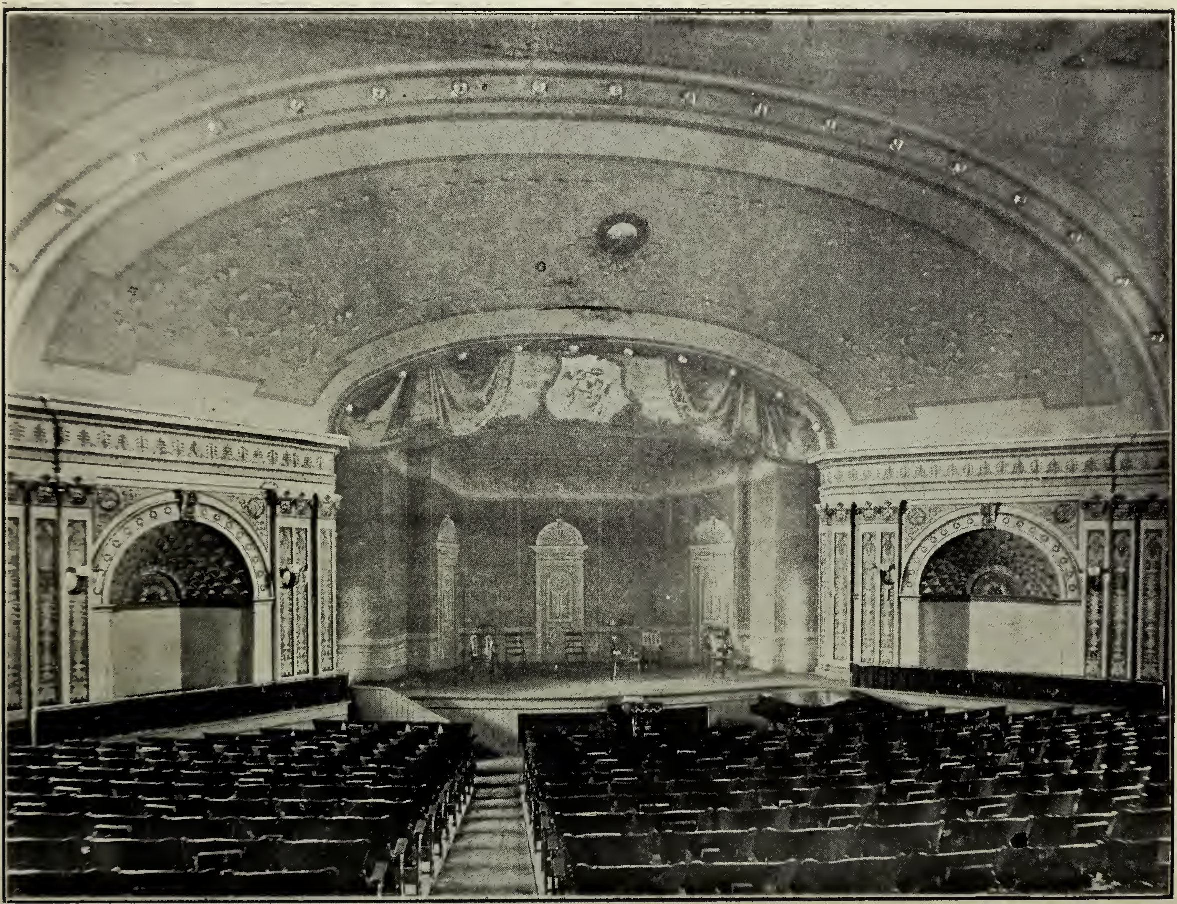
Technical

The Engineering Society, Chemical Association, Ceramic Association and Tesla Club are organizations composed of instructors and students who meet to read and discuss questions of special interest. They aim to assist the students as early as possible in their course to begin the habit of accurate observation and description of engineering work wherever it may be met; also to develop the habit of constant study of periodical engineering literature and to stimulate among all classes of engineers an intelligent appreciation of the great works of engineering of every age and of every kind.

The effect of such societies is a most valuable supplement to the literary societies, as it gives practice in the art of presentation of technical subjects and in extemporaneous speaking and argument. It forms the most fitting training school for the technical societies with which engineers are likely to affiliate after graduation.

Miscellaneous

There are numerous other organizations, membership in nearly all of which is open to all students. Their various objects are sufficiently indicated by the following titles: the Biological Club, the Political Science Club, the Sketch Club, the English Club, the Dramatic Club, the Glee Club, the Mandolin and Guitar Club, the Banjo Club, the Orchestra and the Male Quartet.



AUDITORIUM

Admission

The entrance examinations for 1901 will be held on Monday and Tuesday, September 22 and 23.

Applicants for admission to the College of Engineering must be at least 17 years of age. They must be provided with testimonials of good moral character from their last instructor. If they have previously attended any other college or university, they must present a letter of honorable dismissal therefrom. They must also give evidence of proficiency in the studies required for admission, either by *certificate* or *examination.*

CERTIFICATES

Certificates will be accepted in place of examination for those studies covered by them, when presented by graduates of such High Schools, Academies and Normal Schools in Ohio as have had their courses of study duly approved by the University.

In cases where the University faculty has specially designated any High School, on account of the high character of its work, as entitled to the privilege, students who have attended the school for at least two full years may present certificates for such entrance subjects as their work has covered, and will receive credit for the same.

Certificates, to be considered, must contain a detailed statement of the studies pursued, the text book used, and the amount of work done in each study, the amount of time devoted to it and the applicant's rank or standing. Blank forms for such certificates will be furnished on application.

All certificates will be passed upon by officers of the College of Engineering, and where certificates are received prior to September 1, applicants will be notified by mail, of the subjects, if any, upon which their certificates will be accepted in lieu of examination. In those subjects in which credit is not allowed, the regular entrance examination must be passed. Certificates sent in later than September 1 will be given the same consideration as those received earlier, but the College will not undertake to reply by mail and delay in matriculation may result.

EXAMINATIONS

Applicants presenting no certificates, together with those whose certificates are not accepted in full satisfaction of the entrance requirements, must pass examination on the subjects set forth below, or in such part of the same as has been found unsatisfactory in their certificate.

Entrance examinations will be held on Monday and Tuesday immediately preceding Commencement day and on Monday and Tuesday immediately preceding the opening of the first term of each year. Examinations not taken in this period may be taken thereafter subject to the convenience of the Professor in charge.

REQUIREMENTS FOR ADMISSION TO THE FOUR-YEAR COURSES

Applicants to be admitted to full university standing must obtain credit for all the subjects given below before entrance. Applicants who are slightly in arrears in these requirements, may be admitted to Freshman work, subject to certain entrance conditions as set forth in page 108. For the information of such applicants, a weighting or value is attached to those subjects in the following list upon which entrance conditions are permitted. From these they may determine their claims to admission and upon what subjects it will be necessary to strengthen themselves before coming to the University.

1. Mathematics

In addition to a thorough knowledge of arithmetic, the mathematics required comprise:

Algebra. Taylor's Academic is preferred, but Wentworth's, White's or Wells' Elements are accepted.

Geometry, Plane and Solid. Venable's, Wentworth's, White's or Wells'.

No deficiencies are permitted in Mathematics.

2. English

In addition to a good knowledge of Grammar, there is required:

English Composition and English Classics. — Each applicant will be tested as to his ability to write clear and correct English. The test will be the writing of several brief essays, of which one will be upon a subject drawn from the applicant's observation or experience, and the others upon topics requiring a knowledge of the following books, *or equivalents*: Shakespeare's *Merchant of Venice*, *Julius Caesar*, and *Macbeth;* Milton's *Lycidas, Comus, L'Allegro, and Il Penseroso;* Burke's *Conciliation with the Colonies;* Macaulay's *Essays on Milton and Addison;* The Sir Roger de Coverly Papers in *The Spectator;* Goldsmith's *The Vicar of Wakefield;* Coleridge's *The Ancient Mariner;* Scott's *Ivanhoe;* Carlyle's *Essay on Burns;* Tennyson's *The Princess;* Lowell's *The Vision of Sir Launfal;* George Eliot's *Silas Marner.*

Scott and Denney's Composition and Rhetoric is recommended as a guide for the written work.

A weighting of one unit on each subject, or two units on both, is placed on this work.

3. Language

A knowledge of one language other than English is required for admission. French or German is preferred, but Latin will be accepted. Students preparing for an Engineering course are advised to take as early an opportunity as possible to begin the study of a modern language.

Those entering with French or German will be required to pursue the same language. The following are the requirements for each language:

Latin — Pronunciation (the Roman method); Grammar (an exact knowledge of the inflections is essential); Cæsar, the first four books of the De Bello Gallico.

French — The whole subject of French Grammar. Applicants will be expected to read at sight easy French and to translate correctly into French, simple English sentences.

German — Joynes–Messner's German Grammar, complete; Joyne's German Reader, complete; Hauff's Liechtenstein, Lessing's Minna von Barnhelm, Huss's Sessenheim and Buchheim, Goethe's Dichtung und Wahrheit.

A weighting of three units is placed on either of the three languages.

4. History

United States History. McLaughlin's History of the American Nation preferred. *A weighting of one unit is placed on this subject.*

General History. Myer's General History preferred. *A weighting of one unit is placed on this subject.*

Civil Government. Fiske or Thorpe preferred. *A weighting of one unit is placed on this subject.*

5. Science

Physics. Carhart and Chute, Gage, Avery or an equivalent. *A weighting of two units is placed on this subject.*

Physical Geography. Geike's Elementary Lessons or its equivalent. *A weighting of one unit is placed on this subject.*

ENTRANCE CONDITIONS

1901 — 1902

For the year 1901–1902, no student will be admitted to the College of Engineering who is in arrears more than *two units other than language,* and of this amount, none may be in Mathematics. In the case of students who cannot meet these language requirements, the following arrangements will be made:—

1. Those entering with less than the required amount of Latin will be permitted to make good their deficiency by an equivalent amount of work in French, German or Spanish. For this work they will receive no college credit.
2. Those entering with no training in language will be permitted to make good their deficiency by beginning either French, German or Spanish in the college. For this work they will receive no college credits.

1902 — 1903

Beginning with 1902–1903, no student will be admitted to the College of Engineering who is in arrears more than *two units,* none of which may be in mathematics, unless he is over 21 years of age. In that case, his deficiencies may include entrance language in addition to the above amount.

Removal of Conditions

All entrance conditions must be removed by the end of the second year, and by examination by the University officers. Certificates will not be received for entrance conditions after matriculation.

REQUIREMENTS FOR ADMISSION TO THE SHORT COURSES

Applicants must not be less than seventeen years of age, and unless they are over twenty-one years of age must pass an examination in Arithmetic, Geography, Grammar and Orthography, or bring High School or other certificates for these branches.

Applicants who are over twenty-one years of age are admitted without examination.

ADMISSION AS SPECIAL STUDENTS

Students who desire to pursue special lines of work in the University, and do not desire to become candidates for degrees, will be admitted on the following conditions:

1. The regular entrance requirements must be satisfied.

But applicants who are not less than eighteen years of age, after obtaining credit for elementary or "grade" work, and for such other subjects as may be necessary to qualify them for the classes that they wish to enter, may, on the presentation of satisfactory reasons, be admitted by the Faculty to any class in the College; provided, that if any student who has been admitted on these conditions afterwards becomes a candidate for a degree, he shall take the omitted entrance examinations at least twelve months before the degree is conferred.

2. On entering the College, students desiring to pursue special work are required to lay before the Faculty, for approval or modification, a written statement of the end they have in view, the studies proposed for the attainment of that end, and the probable period of attendance. Such students will be held as strictly to their accepted schemes of work as are the regular undergraduates to their courses of study.

3. *Permission to enter as special undergraduates will be refused to all who fail to give satisfactory evidence of definiteness of purpose and will be withdrawn whenever the conditions on which it was granted cease to exist.*

ADMISSION TO ADVANCED STANDING

1. Applicants who do not come from some other University or College must first obtain admission in the manner already described. They will then be examined on the undergraduate studies for which they ask credits.

2. Applicants who come from the collegiate department of an approved College, and who bring explicit and official certificates describing their course of study and scholarship, and also certificates of honorable dismission, will be admitted without examination, except such as may be necessary to determine what credit they are to receive here for work done in the College from which they come.

Attendance

Registration

All students are required to register and pay their term fees on or before the first day of each term, between the hours of 8:00 a. m. and 12 m., or between 1:00 and 4:00 p. m., central standard time.

Former students who fail to register as above will be charged one dollar in addition to the usual incidental fee, for the first day of delinquency, and fifty cents additional for each subsequent day.

No candidate for graduation will be permitted to register for the second term of his graduating year, except upon presentation to the Bursar of the President's certificate that his thesis subject has been announced and approved.

Amount of Work

No student is permitted to take less than fifteen credit hours a week of any sort of work, except by special permission, and no student will be permitted to take more than the regular work of the class to which he belongs, who has not passed all his work for the preceding term. A credit hour means one hour class room work in lecture, recitation or quiz, or two hours of laboratory work, once a week for one term.

Elective Studies

All elections of work in continuous studies, when once made, are understood to be made for the entire collegiate year.

The right is reserved to each professor to withdraw the offer of any elective study when it is not chosen by at least four persons.

Consultation

For consultation or information regarding work in any class or department, students will apply to the professor or instructor in charge.

For consultation or information in regard to their status as members of the College of Engineering, or for the filing of petitions, changes of course, changes of class cards, adjustment of schedules and similar needs, students will apply to the Secretary, who can be found every school day at his desk in the faculty room, University Hall, from 9 to 10 a. m.

On matters affecting their connection with the University, or in any way connected with the discipline of the institution, students will apply to the President of the University.

Examination and Standings

At the close of any term a student failing to pass in two-thirds of his work will be considered on probation; and a second similar failure incurred within the following ten academic months will forfeit his connection with the University.

The Convocation

At the opening of the year in September, 1900, the daily chapel exercises were abandoned. As a substitute for the short daily exercise, an entire hour is now devoted to a convocation at which the president presides. In addition to devotional exercises, an address is delivered upon some suitable topic. During this hour the libraries and laboratories are closed and no other University exercises occur. It is expected that the Faculty and students will attend. The hour is definitely fixed at ten o'clock on Wednesday of each week. The public is always welcome at the Convocation.

Graduation

Thesis

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of this study must lie within the field of the degree sought. The subject must be announced to the President of the University (dependent upon the approval of the head of the Department), not later than the beginning of the second term of the fourth year; and the completed thesis must be presented on standard paper of certain size and quality, type-written, bound, and titled, not later than the second Saturday before Commencement Day.

Degrees

The degree of Civil Engineer in Architecture is conferred on those who have completed the course in Architecture; that of Engineer of Mines in Ceramics to those who have completed the Course in Ceramics; that of Bachelor of Science in Chemistry on those who have completed the Course in Chemistry; that of Civil Engineer on those who have completed the Course in Civil Engineering; that of Mechanical Engineer in Electrical Engineering on those who have completed the course in Electrical Engineering; that of Bachelor of Science in Industrial Arts on those who have completed the Course in Industrial Arts; that of Bachelor of Science in Manual Training on those who have completed the Course in Manual Training; that of Mechanical Engineer on those who have completed the Course in Mechanical Engineering; that of Engineer of Mines on those who have completed the Course in Mining Engineering.

Except by unanimous consent of the Faculty, no candidate for graduation will be recommended for a degree whose record is not in all respects complete by the Friday evening previous to the Commencement Day on which he seeks the degree.

Expenses

Fees

Each student is required to pay an incidental fee of eighteen dollars a year, and the usual fees for the expense of laboratory work. Tuition is free.

Laboratory Fees.—Students in the laboratories and shops are required to pay fees to cover, in part, the cost of the material consumed, and the deterioration of the expensive instruments used by them. The fees charged per term in the laboratories mentioned below are as follows:

Ceramics, 4, 5, 6, 9, 10, 11, 12	$5 00
Drawing, 7	2 00
Electrical Engineering, 4 and 5 (4 or 5 hrs.), $7; (3 hrs. or less)	5 00
Gymnasium	1 00
Shop Work, 4 hrs or less	5 00
Shop Work, 5 hrs. or more	7 00
Mechanical Engineering, 12, 14, 15, 17, 24, 25, 27, 28, 29 and 30	5 00
Physics, 5, 6, 7, 9 (3 hrs.), $5; (over 3 hrs.)	7 00

In the laboratories of the Department of Chemistry, Ceramics and Metallurgy, each student is required at the beginning of each term to pay a fixed charge of one dollar and fifty cents for gas and water. He is also required to buy his own supplies, which may be obtained at the store-room in Chemical Hall. With reasonable care, this expense need not exceed $5.00 per term.

All term dues must be paid at the opening of each term as a condition of admission to classes.

A fee of five dollars to cover expense of graduation, diplomas, etc., is required of each person receiving one of the ordinary degrees from the University, and this fee must be paid before the degree is conferred.

Other Expenses

There are two dormitories on the University grounds for the use of students. Each occupant is charged by the University a rent of one dollar and fifty cents a term.

The South Dormitory affords unfurnished rooms to such students as desire to board themselves, and thus to reduce their expenses to a minimum. The expense of living in this way falls below two dollars per week. Applications for room should be made to the President of the University.

The North Dormitory will accommodate more than sixty students. Board, furnished rooms, fuel, light and washing are, at present prices, supplied for about three dollars and twenty-five cents a week. Students will be admitted on special recommendation to the President of the University.

Boarding clubs are also formed in the neighborhood of the University. Furnished rooms are rented at seventy-five cents to one dollar a week for each student, and the cost of board is two dollars to three dollars a week.

Board, with furnished rooms, can be obtained in private families, within convenient distances of the University, at rates varying from four dollars to five dollars a week. The ruling rate may be taken as four dollars.

The uniform with which the members of the battalion are required to provide themselves costs about fourteen dollars. It is quiet in pattern, and is designed to be worn daily in place of civilian dress.

The expenses of a student in this College for a year may be estimated as follows, excluding clothing (except uniform) and traveling expenses:

	Low.	Average	High.
Incidental fees	$18 00	$18 00	$18 00
Laboratory fees	15 00	15 00	54 00
Books and stationery	15 00	25 00	40 00
Room	4 50	37 00	75 00
Furniture	10 00	......	......
Board	70 00	110 00	150 00
Uniform	14 00	14 00	14 00
	$146 50	$219 00	$351 00

The second and third estimates for room include light, fuel and care. The third estimate is for a room occupied by a single student. The requirements for laboratory fees and books depend upon the course of study pursued.

Self-Support

There is a large amount of work upon the University farm and in the shops and laboratories assigned to students, preference being given to those who are studying Agriculture or one of the Engineering Courses. But the University cannot promise work to all applicants. Many students find work in private families, in offices, and in various occupations, by means of which they defray at least a portion of their expenses. A person of ability and energy, who is master of a trade, or who can do good work of any kind, can generally find remunerative employment. It has seldom been known that any student of ordinary energy and industry was obliged to leave the University because of a lack of money for necessary expenses, after having been sixty days on the ground — or long enough to inform himself as to the opportunities for securing employment. An employment bureau is maintained at the University, where the names of those seeking work and of those desiring workers are recorded.

Enrollment

APRIL 1st, 1901

STUDENTS IN FOUR YEAR COURSES LEADING TO DEGREES . .	453
STUDENTS IN SHORT COURSES, NOT LEADING TO DEGREES . .	31
SPECIAL STUDENTS	21
TOTAL	505

CLASSIFICATION BY COURSES

Name of Course Pursued	4th Year	3rd Year	2nd Year	1st Year	2nd Year, Short	1st Year, Short	Special.	Total
Architecture	....	3	2	9	....	....	....	14
Ceramics	....	2	5	9	5	6	1	28
Chemistry	8	4	8	10	....	....	5	35
Civil Engineering	11	27	29	53	....	....	2	122
Electrical Engineering	6	11	25	69	....	....	1	112
Industrial Arts	....	....	1	2	4	9	1	17
Mechanical Engineering	7	22	35	51	....	....	1	116
Mining Engineering	2	10	10	21	2	6	2	53
Special, Unclassified	....	....	......	......	....	....	8	8
Total.....................	34	80	115	224	10	21	21	505

NOTE: — For list of names, consult the General Catalogue of the University, which will be sent on application.

Graduates.

CIVIL ENGINEERS (C. E.)	84
MECHANICAL ENGINEERS (M. E.)	56
MINING ENGINEERS (E. M.)	50
ELECTRICAL ENGINEERS (M. E. in E. E.)	97
CHEMISTRY (B. Sc. in Chemistry)	2
INDUSTRIAL ARTS (B. Sc. in Ind. Arts)	2
CERAMICS (E. M. in Ceramics)	1
MASTER OF SCIENCE, CONFERRED BY COLLEGE OF ENGINEERING	2
TOTAL DEGREES CONFERRED	294
NAMES COUNTED TWICE	5
TOTAL NUMBER OF GRADUATES	289

DIRECTORY OF GRADUATES.

The faculty of the College of Engineering are anxious to place a copy of each annual catalogue in the hands of their graduates. They will esteem it a favor if any alumnus who changes his residence will notify the secretary of the College of his new address and occupation. They will also be grateful for any information from any source, that may assist in making or keeping the Directory of the Alumni complete and correct.

A

Ackerman, Eli Osborn, 1884, C. E. Station "B," Columbus, Ohio.	Engineer Maintenance of Way, Columbus Railway Company.
Ackerman, Fremont, 1883, C. E. Los Angeles, California.	Civil Engineer.
Aldrich, Edgar S., 1897, E. E. Livingston, Mont.	Manager Livingston Water Power & Electric Light Co.
Alexander, Charles P., 1896, E. E. Canton, Ohio.	District Manager, Northwestern Mutual Life Insurance Company.
Alexander, St. Clair, 1893, E. E.	
Alsdorf, Frederick C., 1892, E. M. Central City, Colorado.	Superintendent, Mt. Wilson Gold & Silver Mining Company.
Alsdorf, Percy Reed, 1896, E. M. Central City, Colorado.	Standard Assay Office.
Arnold, Edwin Ebert, 1898, M. E.	
Atkinson, Warren, 1899, M. E. Brooklyn, New York.	Maintenance Dept. New York Telephone Co.
Auld, James A., 1897, E. E. Columbus, Ohio.	With D. S. Auld.

B

Barcus, Miner, 1897, E. E. Schnectady, N. Y.	Draftsman with General Electric Company.
Barnaby, Charles L., 1898, C. E. Cincinnati, Ohio.	Assistant on Engineer Corps, Cincinnati Division, P., C., C. & St. L. Ry.

Barrows, Harry H., 1898, C. E. Lexington, Ky.	Resident Engineer Cinti. Southwestern Railway.
*Bartholomew, Clyde S., 1896, C. E.	Died June 23, 1900.
Beach, David Price, 1895, C. E. Wellsville, Ohio.	Assistant, Engineer Corps, Pennsylvania R. R. Company.
Beck, Arthur Andrew, 1893, C. E. Columbus, Ohio.	Deputy County Surveyor.
Belden, Sanford Bonner, 1895, E.M. Pittsburgh, Pa.	Manager Pittsburg Office Jeffrey Manufacturing Company.
Biebel, Herman M., 1896, E. E. Chicago, Illinois.	Engineering Department, Western Electric Company.
Bischoff, John Wallace, 1899, E.M. Robertsdale, Pa.	Engineer Rockhill Iron and Coal Co.
Bissing, William, 1893, E. E. Washington, D. C.	Examiner, U. S. Patent Office.
Blackburn, Frank H., 1896, E. E. Fostoria, Ohio.	Electric Engineer, Fostoria Incandescent Lamp Company.
Bloom, J. George, 1889, C. E. Chillicothe, Ohio.	Division Engineer, Ohio Division B. & O. R. R.
Bowden, Harry William, 1900, C. E. 579 E. Division St., Chicago, Ill.	With Structural Dept. Illinois Steel Co.
Bower, Jerome G., 1897, M. E. Columbus, Ohio	Motive Power Dept. P., C., C. & St. L. R. R.
Bradford, Joseph Nelson, 1883, M.E. Columbus, Ohio.	Professor, Drawing, Ohio State University.
Brophy, James Francis, 1899, E. M. Coopers, W. Va.	Engineer for Cooper Interests in Mercer and McDowell Counties.
Brown, Frederick W., 1888, E. M. Portland, Colorado.	Chemist for Colorado Portland Cement Co.

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* Dead.

Brown, Newton H., 1893, E. E... Newark, Delaware.	Professor Electrical Engineering, Delaware College.
Brumley, Daniel Joseph, 1895, C. E. Louisville, Kentucky.	Assistant Engineer, Louisville & Nashville R. R.
Bruning, Henry D., 1896, C. E... Logansport, Ind.	Assistant Engineer, P., C., C. & St. L. R. R.
Buchenberg, Alvin E., 1900, E. E.. Schenectady, N. Y.	
Buckman, Arthur L., 1897, E. E. Toledo, Ohio.	Wire Chief, Central Union Telephone Company.
Burns, James Furgeson, 1891, C.E. Hopkinsville, Kentucky.	Assistant Engineer, Louisville & Nashville R. R.
Bygate, Harry G., 1899, M. E..... Munhall, Pennsylvania.	Draftsman, Homestead Steel Wks.

C

Calkins, George Herbert, 1895, E. E. Schenectady, N. Y.	Production Clerk, General Electric Company.
Capron, Marshall F., 1888, M. E..	
Carr, Hugh Stanley, 1896, E. E.. Lawrence, Kansas.	Assistant Professor Electrical Engineering, University of Kansas.
Carroll, Patrick Henry, 1894, E. M. Herrin, Illinois.	Superintendent, Big Muddy Coal & Iron Company.
Carson, Samuel King, 1895, E. E. Manila, P. I.	Acting Assistant Surgeon, U. S. A.
Catlin, Homer Clark, 1896, C. E. Allegheny, Pa.	Bridge Draftsman, McClintic-Marshall Construction Co.
Cavanaugh, Andrew F., 1900, M.E. Lockport, N. Y.	Draughtsman Holly Mfg. Co.
Cellarius, Frederick J., 1888, C. E. Dayton, Ohio.	Assistant City Engineer.

Chappell, Walter Evans, 1898, E.E. U. S. F. S. "Chicago," South Atlantic Station, S. A.	First Class Electrician U. S. S. "Chicago."
Cilley, Raymond, 1896, M. E. Brooklyn, N. Y.	Asst. to Gen. Supt., D. E. Dion-Bouton Motorette Co.
Clarke, C. J., 1899, C. E. Chillicothe, Ohio.	Draftsman County Engineer's Office.
Coddington, Edwin F., 1896, C. E., M. Sc., 1897. Berlin, Germany.	Post-graduate student.
Cole, George Nathan, 1891, E. E. 265 Broadway, New York, N. Y.	Contractor Railroad Supplies.
Collins, Curtis, 1895, E. E. San Juan, Puerto Rico.	Electrical Engineer for S. A. Luz Electrica and Rio Plata Electric Co.
Connell, William A., 1886, E. M. Kansas City, Missouri.	Secretary, Virginia Manganese Iron & Coal Company.
Conway, Hugh L., 1896, C. E. Cincinnati, Ohio.	Levelman, New Water Works.
Cope, Albert N., 1897, E. E. Columbus, Ohio.	
Covell, Vernon Royce, 1895, C. E. Pittsburgh, Pennsylvania.	County Engineer's Assistant.
Cunningham, E. W., 1894, C. E. Pittsburgh, Pennsylvania.	Pittsburgh Bridge Works.
Curtis, Leigh Goodrich, 1899, C. E. Zanesville, Ohio.	Department M. of W., B. & O. R. R.

D

Damron, Carson W., 1897, M. E. Fairmont, W. Va.	Chief Draftsman, Wagner-Palmros Mfg. Co.
Davis, Charles William, 1894, E.M. Colorado Springs, Col., care J. McK. Ferriday & Co.	General Mining Business.

Davis, Oscar Allen, 1897, E. E. Alliance, Ohio.	Draftsman, Morgan Engineering Company.
Deahl, Walter Smith, 1896, C. E. Pittsburgh, Pennsylvania.	Pittsburgh Bridge Company.
DeLoffre, Andre, 1896, E. E. Silverton, Colorado.	Electrical Engineer, Silver Lake Mines.
Diemer, Hugo, 1896, E. E. Agricultural College, Mich.	Assistant Professor Mechanical Engineering, Agricultural College.
Donham, Maurice D., 1896, M. E. Warren, Pennsylvania.	Chief Draughtsman, Jacobson Machine Mfg. Co.
Drummond, William G., 1900, M.E. Cleveland, Ohio.	Draftsman, The Brown Hoisting Machinery Co.
Dun, John J., 1883, E. M. Columbus, Ohio.	Consulting Engineer.
Dunlap, Thaddeus Cox, 1895, E. E. Columbus, Ohio.	Manager Columbus Pneumatic Tool Co.
Dunlop, Robert Rowe, 1900, E. E. Schenectady, N. Y.	Testing Department General Electric Co.
Dunnick, Edward, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.

E

Erskine, James H., 1886, E. M. Albany, Oregon.	Physician and Surgeon.
Estep, Frank Leslie, 1898, E. E. Bridgeport, Conn.	Foreman Copper Rolling Mill, Bridgeport Brass Co.
Evans, Peter Platter, 1892, C. E. Cleveland, Ohio.	Engineer of Erection, King Bridge Company.
Eysenbach, Ernest E., 1896, E. M. Columbus, Ohio.	Superintendent, Columbus Gas Company.

F

Feicht, Russell S., 1890, E. E.... Pittsburgh, Pennsylvania.	Engineering Department, Westinghouse Electric & Manufacturing Company.
Fergus, Guy Carlton, 1898, E. E.. Zanesville, Ohio.	Partner, Zanesville Electric Co.
Fickes, Walter Morgan, 1900, E.M. (Ceramics). Carnegie, Pa.	Manager of the Rosslyn Brick Co.
Fish, Fred Alan, 1898, E. E...... Madison, Wis.	Honorary Fellow in Electrical Engineering at University of Wisconsin.
Floto, Julius, 1889, E. M......... Anaconda, Montana.	With Anaconda Copper Mining Co.
Flynn, Benjamin H., 1898, C. E.. Columbus, Ohio.	Engineer to the Ohio State Board of Health.
Flynn, Harry Franklin, 1892, C.E. Washington, D. C.	Assistant on U. S. Coast and Geodetic Survey.
Foster, Frank M., 1894, E. E.... Cincinnati, Ohio.	With John N. Poage, Water Columns and Valves.
Fowler, Harry R., 1894, E. E.... Toledo, Ohio.	Electrical Engineering and Contracting.
Fox, John Herbert, 1897, M. E.... Cleveland, Ohio.	Mechanical Engineer in Charge of Engine Dept., The Brown Hoisting Machinery Company.
Frankenburg, John T., 1899, E. E. Columbus, Ohio.	With Central Union Telephone Co.
Fravel, George B., 1888, M. E.... Columbus, Ohio.	Mechanical Engineer, Pennsylvania Lines.
Frayer, Lee Ambrose, 1896, M. E. Columbus, Ohio.	Frayer & Miller, Motor Cycles.
Freeman, Stanton S., 1898, E. M. Parryville, Pennsylvania.	Superintendent, Carbon Iron & Steel Company.

French, Thomas Ewing, 1895, M.E. Columbus, Ohio.	Assistant Professor of Drawing, Ohio State University.
Frost, George Winfield, 1900, M. E. Columbus, Ohio.	Fellow in Mechanical Engineering, Ohio State University.

G

Gallen, William F., 1897, M. E.. Columbus, Ohio.	Jeffrey Manufacturing Company.
Gamper, Herman, 1899, M. E..... Easton, Pa.	Ingersoll–Sergeant Drill Co.
Garber, John Murray, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.
Gee, Eugene C., 1897, E. E........ Wheeling, West Virginia.	Wire Chief, C., D. & P. Telephone Co.
Gehrkens, Edward F., 1894, E. E. Schenectady, N. Y.	General Electric Company.
Given, James Byron, 1896, E. E.. Chicago Illinois.	Western Electric Company.
Goddard, Loring Hapgood, 1892, C.E. Manara, Ohio.	Farmer and Stockman.
Goodell, Ralph Spencer, 1892, C.E. Mt. Vernon, Ohio.	Principal Assistant Engineer, Mt. Vernon Bridge Works.
Graham, Emery Eugene, 1898, E.E.	
Grate, Charles Artemus, 1898, M.E. Warren, Pennsylvania.	Struthers, Wells & Co.
Green, Jerome Joseph, 1893, E. E.. Notre Dame, Indiana.	Professor of Physics and Electrical Engineering, University of Notre Dame.
Green, Joseph Farist, 1899, E. E.. Moline, Illinois.	Electrical Engineer, M. E. Co.
Gregory, Hiram D., 1880, E. M.... Covington, Ky.	Attorney-at-law.

Griffin, Mark H., 1897, E. E. Toledo, Ohio.	
Groves, John Wesley, 1898, C. E. Athens, Ohio.	Engineer for Sunday Creek Coal Co.

H

Haas, F., 1895, C. E.; 1896, E. M. Catoctin Furnaces, Md.	Manager Blue Mountain Iron & Steel Co.
Hale, Frederick James, 1898, M.E.; 1900, M. Sc. Pittsburgh, Pa.	Westinghouse Machine Co., Gas Engine Dept.
Hall, Harry R., 1889, E. M. Port Townsend, Wash.	Resident Engineer, Wellman-Seaver Engineering Co.
Harkins Robert Rusk, 1900, M. E. Columbus, Ohio.	With Crass Harkins.
Harrison, William H., 1885, C. E. Clifton, Arizona.	Civil and Mining Engineer.
Hartwell, Arthur, 1888, M. E. Chicago, Illinois.	Manager, Chicago Office, Westinghouse Electric & Mfg. Co.
Hartwick, Louis M., 1897, M. E. Pueblo, Colorado.	Colorado Fuel & Iron Co.
Hassler, Robert Hanich, 1892, E.E. Indianapolis, Indiana.	Electrical Engineer, American Bicycle Co., Waverly Factory.
Hayman, William C., 1900, E. E. Schenectady, N. Y.	Testing Dept. General Electric Co.
Hayward, George E., 1893, C. E. Mankato, Minn.	Roadmaster, C. & St. P., M. & O. Ry.
Hazlett, Robert Jr., 1887, C. E. Wheeling, West Virginia.	Consulting Civil Engineer, County Engineer and Chief Engineer N. O. U. Electric Ry.
Hebble, Charles Roy, 1896, E. E.	
Heller, Albert Henry, 1890, C. E. New York, N. Y.	Assistant to Vice-President, American Bridge Co.

Henderson, Adelbert A., 1898, C.E. Pittsburgh, Pennsylvania.	Transitman, County Engineer.
Henretta Charles M., 1896, E. M. Fernic, B. C.	Mining Engineer.
Hertner, John Henry, 1899, E. E. Cleveland, Ohio.	Foreman of Machine Shop, Lincoln Electric Co.
Hewitt, Strafford R., 1898, E. E.. Columbus, Ohio.	Engineer for Columbus Mine and Mill Supply Co.
Hine, Lucius A., 1888, E. M...... Chicago, Illinois.	President and Treasurer, Hine-Watt Manufacturing Company.
Hipple, John Merton, 1898, E. E. Wilkinsburg, Pennsylvania.	Inspector, Westinghouse Electric & Manufacturing Company.
Hirsch, Gustav, 1897, E. E....... Columbus, Ohio.	Engineer, Columbus Citizens' Telephone Company.
Homan, Frank, 1895, C. E........ Cannelton, West Virginia.	General Manager and Treasurer of the Raven Coal & Coke Company.
Howald, Ferdinand, 1878, B. Sc.; 1881, E. M. Rush Run, Fayette Co., W. Va.	Coal Operator.
Howells, E. S., 1884, E. M........ Massillon, Ohio.	Engineer, Howells Mining Company.
Howells, Thomas J., 1897, E. M.	
Hunt, William F., 1887, M. E.... St. Paul, Minn.	Attorney-at-law.
Hunter, Madone C., 1900, E. E... Chicago, Illinois.	With Western Electric Co., Dynamo Department.
Huntington, Arthur, 1899, M. E. Evanston, Illinois.	Chief Engineer, Evanston Electric Illuminating Co.
Hyle, Charles A., 1896, E. E..... Kansas City, Mo.	Observer U. S. Weather Bureau.

I

Ireland, Guy L., 1895, M. E.	
Irvin, Chadwick H., 1897, M. E. Sharon, Pa.	Draftsman, Sharon Steel Co.

J

Jenkins, William G., 1893, C. E. Bellefontaine, Ohio.	Draftsman, The Bellefontaine Bridge & Iron Co.
Jenkins, Willis H., 1894, C. E. Carnegie, Pa.	Transitman, Pennsylvania Lines West of Pittsburg.
Jennings, Levi E., 1897, E. E. Eaton, Ohio.	With County Surveyor at Dayton, Ohio.
Johnson, Charles W., 1896, E. E. Cincinnati.	Chief Draftsman, Bullock Electric Manufacturing Company.
Johnson, Earl Stinson, 1900, E. E. Chicago, Illinois.	With Western Electric Company.
Johnson, Herbert L., 1892, E. E.	
Johnston, George E., 1892, C. E. Louisville, Kentucky.	Civil Engineer, L. & N. R. R. Co.
*Jones, A. A., 1886, C. E.	Died May, 1894.
Jones, Arthur James, 1898, E. E. Wilkinsburg, Pennsylvania.	Draftsman, Westinghouse Electric & Manufacturing Company.
Jones, Alexander H., 1895, E. E. St. Louis, Mo.	Consulting Electrical and Mechanical Engineer.
Jones, Pearl N., 1892, E. E. Wilkinsburg, Pennsylvania.	Engineer and Salesman, Westinghouse Electric & Mfg. Co.
Jones, Smilie, 1894, E. M. Prescott, A. T.	Superintendent, Empire Gold Mining & Milling Company.

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* Dead.

Judd H., 1897, M. E.; 1899, M. Sc. Brooklyn, N. Y.	Assistant in Technical Laboratory, Pratt Institute.

K

Kanmacher, Samuel H., 1900, E. E. Schenectady, N. Y.	Testing Department, General Electric Co.
Keffer, Fredrick, 1882, E. M...... Anaconda, British Columbia.	General Manager, The British Columbia Copper Co., Ltd.
Kemmler, Edward A., 1888, C. E.. Columbus, Ohio.	Assistant City Engineer.
Kerr, Samuel Thompson, 1894, E.E. Martins Ferry, Ohio.	Superintendent Municipal Electric Light Plant.
Kester, Fredrick Edward, 1895, E.E. Columbus, Ohio.	Instructor in Physics, Ohio State University.
Kiesewetter, L. F., 1891, C. E.... Columbus, Ohio.	Cashier, The Ohio National Bank.
Kline, Charles H., 1897, E. E.... Dayton, Ohio.	Civil Engineer and Deputy County Surveyor.
Knecht, Arthur E., 1898, M. E... Cincinnati, Ohio.	Mechanical Engineer, Cincinnati Screw & Tap Co.
Knight, William Abner, 1900, E.E. Columbus, Ohio.	Assistant Professor of Machine-Shop Practice, Ohio State University.
Knox, Frank S., Jr., 1900, E. M.. Grays Flat, West Virginia.	Resident Engineer Federal Coal and Coke Co.
Krumm, Louis Ralph, 1898, E. E.. Columbus, Ohio.	Engineer, Columbus Citizens' Telephone Company.
Kuhn, Vallie Howard, 1896, E. E. Etna, Ohio.	

L

Lamb, Whitney Earl, 1900, E. E. Schenectady, N. Y.	Testing Department, General Electric Company.

Lamme, Benjamin G., 1888, M. E. Pittsburg, Pennsylvania.	Engineer, Westinghouse Electrical & Manufacturing Company.
Lamme, Bertha A., 1893, E. E. Pittsburgh, Pennsylvania.	Westinghouse Electric & Manufacturing Company.
Large, Joseph H., 1890, C. E. Massillon, Ohio.	Draftsman, Massillon Bridge Co.
Lee, Corliss Edgar, 1900, E. E. Schenectady, N. Y.	With General Electric Company.
Lee, Robert M., 1897, M. E. Schenectady, N. Y.	Draftsman, General Electric Co.
Levering, Orpheus D., 1893, M. E. Columbus, Ohio.	Foreman of Tool Room, Columbus Machine Company.
Lincoln, Paul M., 1892, E. E. Niagara Falls, N. Y.	Resident Electrician, Niagara Falls Power Company.
*Lindo, William C., 1896, C. E.	Died, 1900.
Linebaugh, Jesse Joseph, 1899, E. E. Schenectady, N. Y.	Electrical Engineer, Testing Department, General Electric Co.
Linville, C. P., 1900, B. Sc. (Chem.). Columbus, Ohio.	Fellow in Chemistry, Ohio State University.
Logan, Lavallette L., 1896, E. M.	
Lott, Charles Milford, 1895, E. E. Hicksville, Ohio.	Proprietor and Superintendent of Hicksville Electric Light Plant.
Lovejoy, Ellis, 1885, E. M. Union Furnace, Ohio.	Superintendent, Columbus Brick & Terra Cotta Company.
Lyon, Arthur H., 1900, M. E. Memphis, Tenn.	Brick Manufacturer.

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* Dead.

M

Manley, Rush Emmett, 1894, E.E. Mt. Vernon, Ohio.	Manager, Telephone Exchange, Central Union Telephone Co.
Marquard, Frank F., 1896, C. E.. Sharon, Pennsylvania.	Chief Chemist, The Sharon Steel Company.
Marshall, Willard B., 1900, E. E.	
Martin, George, 1897, E. E........ Youngstown, Ohio.	Wire Chief, Central Union Telephone Company.
Martin, Percy, 1892, E. E........ Milan, Italy.	General Manager, Mediterranean Electrical Mfg. Company.
Marvin, Charles F., 1883, M. E... Washington, D. C.	Professor of Meteorology, in Charge Instrument Division, U. S. Weather Bureau.
Masters, George Albert, 1886, C.E. 4558 Oakenwald Avenue, Chicago, Illinois.	Assistant Manager, Western Library Association.
Matson, William Edgar, 1896, E.E. Lynn, Massachusetts.	Production Department, General Electric Company.
McAllen, William J., 1894, C. E.. Chicago, Illinois.	Civil Engineer, Structural Department, Illinois Steel Company.
McCarter, Robert D., Jr., 1895, E.E. 110 Cannon St., London, E. C., England.	Electrical Engineer, General Electric Company of New York .
McCormick, John H., 1880, M. E.. Columbus, Ohio.	Mechanical Engineer.
McCormick, William F., 1896, M.E.	
McGrew, John A., 1895, C. E..... Logansport, Indiana.	Engineer, M. of W. Pennsylvania Company, Logansport Division.
McGuffey, Francis H., 1894, E. E. Lima, Ohio,	Designer.

McIntire, Alfred Heber, 1898, E.E.; 1900, M. E. Schenectady, N. Y.	Testing Department, General Electric Company.
McNarry, George B., Jr., 1896, E.E. Toledo, Ohio.	Traveling Salesman, T. Bissell & Company.
Menough, Arthur G., 1894, E. M. Wellsville, Ohio.	Assayer and Chemist.
Mercer, Frank Emmett, 1896, E.E. Wauseon, Ohio.	Manufacturer.
Mershon, Ralph D., 1890, M. E. New York City.	Consulting Engineer.
Miller, Frank Case, 1893, C. E. Dwight, Illinois.	Supervisor, Chicago & Alton R. R., Dwight to Springfield.
Miller, Harry F., 1889, M. E.	
Morris, Clyde Tucker, 1898, C. E. Youngstown, Ohio.	Draftsman, Youngstown Bridge Company.
Morrison, Robert O., 1893, C. E. New Castle, Pennsylvania.	Assistant on Engineer Corps, Erie & Ashtabula Division of Pennsylvania Lines West of Pittsburg.
Morton, George L., 1884, M. E. Washington, D. C.	Principal Examiner, U. S. Patent Office.
Munn, Mortimer Adam, 1894, C.E. Cleveland, Ohio.	Civil Engineer, with E. P. Roberts Company.
Myers, Albert B., 1900, E. M. Fairmont, W. Va.	Engineer for Wagner & Palmros Manufacturing Company.
Myers, Ord, 1895, E. E. New York City.	Inspector, Metropolitan Street Railway Company.
Myers, Roy V., 1893, C. E. Dayton, Tennessee.	Superintendent Mines, Dayton Coal & Iron Co., Ltd.
Myers, Uriah H., 1887, E. M. Pittsburgh, Pennsylvania.	Printer and Stationer.

N

Nagel, William G., 1895, E. E.... Toledo, Ohio.	Manager, W. G. Nagel & Co., Electric Supplies.
Needham, Harry S., 1900, M. E.. Indianapolis, Indiana.	Special Apprentice, Pennsylvania R. R.
Newton, Samuel Donald, 1895, C.E.	
Nicholson, Charles M., 1900, E. E.	
Nold, John H., 1900, E. M........ Columbus, Ohio.	Mine Engineer, Assistant to F. A. Ray.
Nurian, Kerson, 1899, M. E...... Turtle Creek, Pennsylvania.	Westinghouse Electric & Manufacturing Company.

O

O'Brine, David, 1881, B. Sc., M. Sc., 1882, E. M., D. Sc., M. D. Urbana, Ohio.	Physician and Surgeon.
Orton, Edward, Jr., 1884, E. M . Columbus, Ohio.	Professor of Ceramics, Ohio State University, State Geologist of Ohio.

P

Pabodie, Robert Jewett, 1899, M.E. Watertown, N. Y.	Assistant General Foreman, Watertown Steam Engine Company.
Palmer, Walter K., 1893, M. E.. Lawrence, Kansas.	Associate Professor, Department Mechanical Engineering, University of Kansas.
Patch, Homer Austin, 1896, C. E. Minneapolis, Minn.	Draftsman, Gillette-Herzog Manufacturing Company.
Payne, Halbert Edward, 1887, M.E. New York City.	President American Typewriter Company.
Pearl, Allen Sexton, 1894, E. E.. Columbus, Ohio.	Ohio Representative of Central Electric Company, Chicago, Ill.

Pedlow, Edward B., 1893, C. E.... New Straitsville, Ohio.	General Superintendent, C. & H. C. & I. Co.
Pence, David Arrel, 1894, M. E . Lowellville, Ohio.	Business.
Peppel, Samuel Vernon, 1899, B.Sc. (Chem.). Columbus, Ohio.	Assistant in Department of Clay-working and Ceramics, Ohio State University.
Peters, William L., 1885, M. E... Riverside, California.	Merchant and Horticulturist.
Peirce, John Mattison, 1895, E. E. South Charleston, Ohio.	
Pilcher, Hastings Moore, 1895, E.E. Cannelton, West Virginia.	Electrician and Engineer of C. C. Co.
Pleukharp, Rev. C. V., 1885, M. E. La Crescenta, California.	Fruit Grower.
Polk, Walter C., 1895, C. E...... Columbus, Ohio.	Superintendent of Construction, Central Union Telephone Co.
Postle, Herman R., 1894, C. E.... Columbus, Ohio.	Teacher in Columbus North High School.
Powell, Charles S., 1893, E. E... Cleveland, Ohio.	Manager Cleveland Office, Westinghouse Electric & Mfg. Co.
Pratt, Fred Kellogg, 1900, C. E. . St. Clairsville, Ohio.	Topographer, Wheeling & Lake Erie R. R.

R

Rawson, Levi, 1899, C. E......... Sistersville, W. Va.	Engineer, Carter Oil Company.
Ray, Frank A., 1887, E. M....... 137 King Ave., Columbus, Ohio.	Professor of Mine Engineering, Ohio State University.
Ray, William M., 1893, C. E...... Cleveland, Ohio.	Assistant Engineer, C., L. & W. R. R. Co.
Raymond, Coles Abel, 1894, C. E. Toledo, Ohio.	Draftsman, Toledo Bridge Co.

Reed, Robert Browning, 1896, E. E. Zanesville, Ohio.	Partner, Zanesville Electric Co.
Reed, William Allen, 1897, E. M. Querida, Colorado.	Mining Engineer, Bassick Gold Mine Co.
Reeves, Archibald C., 1887, C. E. Dayton, Ohio.	Assistant City Engineer.
Rice, Herbert A., 1897, C. E. Jackson, Ohio.	Assistant Principal High School.
Riddle, Howard Sterling, 1897, E.E. Akron, Ohio.	Mechanical Engineer, The Diamond Rubber Co.
Roberts, Cyrus Swan, 1898, E. M.	Chemist and Assayer.
Robinson, Erdis Geroska, 1893, C.E. Guadalajara, Mexico.	Resident Engineer, Engineering Department, Mexican Central Ry.
Rogers, James Bertrand, 1896, E.M. Leetonia, Ohio.	Chemist, Salem Iron Company.
Root, Willis J., 1885, E. M. Columbus, Ohio.	Chemist, National Steel Company, Columbus Works.
Rowlee, Henry A., 1897, M. E.	Inspector, Ordnance, U. S. Army.
Ruhlen, Carl Marble, 1898, M. E. Tacoma, Wash.	Assistant Quartermaster's Agent, U. S. Army.

S

Schaub, Edward L. T., 1885, M. E. Columbus, Ohio.	Assistant Superintendent, Associated Charities.
Schaup, Charles E., 1897, E. M. Berrysburg, West Virginia.	Chief Engineer, Southern Coal & Transportation Company.
Scheibell, William O., 1888, E. M. Columbus, Ohio.	General Manager, The American Art Tile Company.

Schreiber, George Ernst, 1900, E.E. St. Louis, Mo.	Electrical Engineer, with H. H. Humphrey.
Schreiber, John Martin, 1899, E.E. Cleveland, Ohio.	Engineering Department, Cleveland Electric Street Railway.
Schroll, Otto, 1886, C. E. Wheeling, West Virginia.	Superintendent, Wheeling Terminal R. R. Co.
Sedgwick, Edgar C., 1895, E. E. Columbus, Ohio.	Mechanical Draftsman, The Case Manufacturing Company.
Serva, Adam A., 1893, E. E. Ft. Wayne, Indiana.	Assistant Sales Manager, Fort Wayne Electric Works.
Sharp, Charles C., 1888, C. E. Boomer, West Virginia.	President Raven Coal and Coke Co. and Superintendent Boomer Coal and Coke Co.
Shepherd, Charles W., 1900, C. E. Chicago, Illinois.	With Structural Department, Illinois Steel Co.
Sherman, Chris. E., 1894, C. E. Columbus, Ohio.	Associate Professor, Civil Engineering, Ohio State University.
Simonton, Mark, 1895, E. E. Columbus, Ohio.	Treasurer and General Manager, Electrical Supply & Construction Company.
Skinner, Charles E., 1890, M. E. Pittsburgh, Pennsylvania.	Engineer, Electrical Engineering Department, Westinghouse Electric & Manufacturing Company.
Smith, David William, 1899, C. E. Columbus, Ohio.	Engineer, Hocking Valley Ry. Co.
Snider, Charles M., 1897, B.Sc. (I.A.). Columbus, Ohio.	Draftsman, The Jeffrey Mfg. Co.
Sperr, Frederick W., 1883, E. M. Houghton, Michigan.	Professor of Civil and Mining Engineering, Michigan College of Mines.
Sprague, Clarence M., 1899, C. E. Columbus, Ohio.	Assistant on Engineering Corps, P., C., C. & St. L. Ry., Indianapolis Division.
Spurrier, John Rudolph, 1896, E.E. Wilkinsburg, Pennsylvania.	Mechanical Engineering Department, Westinghouse Electric & Manufacturing Company.

Staley, Marcellus, 1899, E. E....	
Starbuck, Daniel Carl, 1899, E.E.	
Stewart, Harford T., 1896, E. E.. Columbus, Ohio.	Agent, General Electric Company.
Stewart, Lee Raymond, 1896, C. E. Camden, New Jersey.	Draftsman, New York Ship Building Company.
Stinebaugh, Isaac Long, 1892, C.E. Port Clinton, Ohio.	Deputy County Surveyor.
Stone, Carleton Elijah, 1899, C.E. Akron, Ohio.	Civil Engineer, with The Richland & Mahoning Railway Company.
Storer, Norman Wilson, 1891, E.E. Pittsburgh, Pennsylvania.	Westinghouse Electrical & Manufacturing Company.
Storer, Simon B., 1893, E. E...... Syracuse, New York.	Engineer and Salesman, Westinghouse Electric & Manufacturing Company.
Stull, Emmett Willett, 1894, E.E. Johnstown, Pennsylvania.	Engineer, Motor Department, Lorain Steel Company.
*Stump, John William, 1895, C.E.	Died May 31, 1900.

T

Taylor, Arthur W., 1893, E. M... Cleveland, Ohio.	Chemist, Otis Steel Company, Ltd.
Thomas, James O., 1897, C. E.... Columbus, Ohio.	Wire Chief, Central Union Telephone Company.
Tomlinson, James Rowe, 1892, C.E. Chicago, Illinois.	Assistant Engineer, C. & N. W. Ry.
Towne, Robert S., 1879, B. Sc.; 1880, E. M. New York City.	President, Companios Metalurgica Mexicana.

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* Dead.

Tufts, Charles Hill, 1889, E. M. Pittsburgh, Pa.	Assistant Chemist, Schoenberger Works, American Steel & Wire Company.
Turner, Arthur M., 1893, E. E.. 281 Oak St., Chicago, Illinois.	

U

Urban, Harry M., 1898, C. E...... Pittsburgh, Pennsylvania.	Assistant on Engineer Corps, P., C., C. & St. L. R. R. Co.

V

Vandervoort, W. P., 1886, E. M...	
Viets, Willis B., 1886, E. M...... Parryville, Carbon Co., Pa.	Chemist, Carbon Iron & Steel Co., Ltd.
Vosskuehler, Joseph H., 1900, M.E. Miller School, Va.	Professor of Drawing in Miller Manual Labor School.

W

Wadsworth, F. L. O., 1888, B. Sc.; 1889, E. M., M. E. Allegheny, Pennsylvania.	Director Allegheny Observatory.
Walker, James Madison, 1896, C.E. Albion, Ind.	Assistant Resident Engineer, B. & O. R. R. Co.
Watt, Sern P., 1886, M. E....... Morgan Park, Illinois.	Vice-President and Mechanical Expert of Hine-Watt Manufacturing Company, Chicago, Ill.
Weick, C. W., 1898, B. Sc. (I. A.). New York.	Manual Training, Teachers' College, Columbia University, New York.
Welch, Clark J., 1888, C. E......	
Welch, Oliver Bartlett, 1895, E.E. Dennison, Ohio.	General Manager, United Electric Company.
Wilcox Alvan Newton, 1895, E.E.	
Wirthwein, Louis P., 1899, C. E.. Columbus, Ohio.	In City Engineer's Office.

Wise, Albert Joseph, 1898, C. E.. Cleveland, Ohio.	Assistant Engineer, Cleveland & Indianapolis Division, C., C., C. & St. L. R. R.
Wolf, Herman Howard, 1895, C. E. U. S. Steamer Galveston.	Lieutenant, U. S. Revenue Cutter Service.

Z

Zaumseil, Oscar C., 1887, C. E... Webb City, Missouri.	Merchant.
Zurfluh, William N., 1894, E. E. Springfield, Ohio.	Electrical Engineer and Contractor.

List of Graduates from Other Colleges of the Ohio State University Who are now doing Engineering Work.

Bradford, Ernest, 1892, G. Ph. Columbus, Ohio.	Analytical Chemist, with Prof. N. W. Lord.
Calkins, William B., 1898, G. Ph. New Straitsville, Ohio.	Chemist in Steel Works.
Converse, Howard P., 1887, B. Sc. Boston, Massachusetts.	Manager of the Boston Office, Cooper, Hewitt & Co., Steel and Iron Manufacturers.
Evans, Ernest, 1892, B. Sc. Steubenville, Ohio.	Assistant Superintendent, Steel Works at Mingo Junction.
Heath, Arthur T., 1887, G. Ph. Oak Harbor, Ohio.	Analytical Chemist, Consulting Engineer and Contractor.
Humphrey, J. Scott, 1879, B. Sc. Alexandria, Indiana.	City Civil Engineer.
Jones, Jesse Lee, 1890, B. A. Philadelphia, Pennsylvania.	In Charge of Testing Department, William Cramp & Sons, Ship Builders.
Kirker, Harry L., 1889, B. Sc. Havre, France.	Electrical Engineer, Westinghouse Electric & Manufacturing Co.
Knopf, George W., 1883, B. Sc. Pottstown, Pennsylvania.	Engineer, McClintic–Marshall Construction Company.
Lovejoy, Jesse R., 1884, B. Sc. Schenectady, N. Y.	Manager, Lighting, Railway and Supply Department, General Electric Company.
McDowell, John A., 1882, B. Sc. Columbus, Ohio.	Chemist, Specialty Portland Cement Manufacture.
Mix, Edgar W., 1888, B. Sc. Paris, France.	Chief Engineer, Le Societe des Etablissments Postel–Vinay, La CieFrancaiseThompson–Houston.
Moyer, Henry E., 1893, B. Sc. Youngstown, Ohio.	Chief Chemist, Youngstown Steel Company.

Newton, Harry S., 1889, B. Sc. Beaver Falls, Pa.	General Manager, Beaver Valley Traction Company.
Phelps, Cyrus Alba, 1892, B. Sc. San Jose de Ranchos, Sombrereto, Mexico.	Secretary, Cia Minera "Huinachie," S. A.
Ritchey, Joseph C., 1890, B. Sc. Mingo Junction, Ohio.	Junction Iron & Steel Company.
Scott, Charles Felton, 1885, B. A. Pittsburgh, Pennsylvania.	Chief Electrician, Westinghouse Electrical & Manufacturing Co.
Short, Sidney H., 1880, B. Sc. 112 Cannon St., London, E. C., England.	Technical Director, English Electric Mfg. Co.
Smith, Burton Griffin, 1895, G.Ph. Detroit, Michigan.	Chemist, Ray Chemical Company.
Somermier, Edward E., 1898, G.Ph. Ohio State University.	Instructor in Metallurgy, Ohio State University.
Ward, John C., 1880, B. A. Painesville, Ohio.	County Engineer and Surveyor.
Wikoff, John Burkett, 1884, B.Ph. Cambridge, Ohio.	Manager, Cambridge Works, American Sheet Steel Co.

Directory of Those Who have Completed Short Courses.

CERAMICS.

ADAMS, JOHN CARROLL, 1897 Lynchburg, West Virginia.	Timber Purchaser.
BERKEY, LESLIE REESE, 1899 Bolivar, Pennsylvania.	Foreman, No. 4 Works, Reese, Hammond & Co., Fire Brick Makers.
BLEININGER, ALBERT VICTOR, 1897 Columbus, Ohio.	Instructor in Ceramics, Ohio State University.
BRADDOCK, EVERETT F., 1896 Richfield, Ohio.	
CAMPBELL, AUGUSTINE RAY, 1898 Tottenville, S. I., New York.	Chemist, Atlantic Terra Cotta Co.
GIESSEN, CARL, 1896 Garfield, Ohio.	Superintendent Brick Works, Garfield, Ohio.
GORTON, ELMER ELLSWORTH, 1896 Rome, Georgia.	Chemist and Superintendent, Rome Brick Co., Rome, Ga.
HENSEL, OTTO, 1897 Chicago Heights, Illinois.	Chemist, Ludowici Roofing Tile Company.
ITTNER, WARREN WAYNE, 1899 Belleville, Illinois.	Superintendent of the Anthony Ittner Brick Company.
JONES, EDWARD F., 1896 Zanesville, Ohio.	Kiln Burner, Mosaic Tile Co.
POST, MALCOLM PHELPS, 1899 St. Louis, Missouri.	With Blackmer & Post.
PURDY, ROSS C., 1898 Zanesville, Ohio.	Chemist, Roseville Pottery Co.
THOMAS, DAVID C., 1896 Wellsville, Ohio.	Chemist and Head Burner, U. S. Pottery Company.
WOLFLEY, JOHN W., 1896 Anderson, Indiana.	Burner, Columbia Encaustic Tile Company.
WORCESTER, WOLSEY G., 1899 Winton Place, Cincinnati, Ohio.	Superintendent, Cincinnati Roofing Tile & Terra Cotta Company.

MINING.

Anderson, Arthur, 1898.
Athens, Ohio.

Blower, J. W. 1892.
Bunola, Pennsylvania.

Bohm, Oscar Herman, 1899.
Cleveland, Ohio.

Boyd, Arthur, 1893.
Mine Surveyor. Saginaw, Mich.

Brophy, John S., 1898.
Coopers, W. Va.

Carroll, Patrick, 1891.
Houtzdale, Pennsylvania.

Dixon, C. F., 1890.
Phillipsburg, Pennsylvania.

Evans, John M., 1895.
Shawnee, Ohio.

Fyfe, John, 1891.
Houtzdale, Pennsylvania.

Gildroy, R. E., 1891.
Whatcheer, Pennsylvania.

Harrigan, Archer, 1899.
New Castle, Pennsylvania.

Harrigan, Patrick, 1898.
Jackson, Ohio.

Herron, J. S., 1893.

Jenkins, Jonathan, 1891.
Frostburgh, Maryland.

Laviers, Henry, 1893.
Wellston, Ohio.

Lochrie, John, 1890.
Houtzdale, Pennsylvania.

McKey, R. F., 1894.
Coal Glenn, Pennsylvania.

Moss, James, 1891.
Buffalo, Ohio.

Newton, E. A., 1893.
Jeffries, Pennsylvania.

Nichols, J. L. D., 1895.

Oakes, C. H., Jr., 1892.
Pardoe, Pennsylvania.

Phillips, F. R., 1893.
Laonoconing, Maryland.

Quigley, John, 1893.
Westville, Pennsylvania.

Quigley, Robert, 1894.
Westville, Pennsylvania.

Quinn, John, 1891.
Houtzdale, Pennsylvania.

Ralston, William, 1896.
Cleveland, Ohio.

Rees, David, 1891.

Rees, Evan, 1895.
Jacksonville, Ohio.

Snedden, James, 1892.
Antrim, Pennsylvania.

Tetlow, W. A., 1892.
Washingtonville, Ohio.

Wright, John, 1892.
Antrim, Pennsylvania.

UNIVERSITY BULLETIN SERIES 6 — No. 9

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

OHIO STATE UNIVERSITY

1902-1903

Entered at the Postoffice at Columbus, Ohio, as second-class matter

THE
JOHN CRERAR
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OHIO STATE UNIVERSITY

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

COURSES OF INSTRUCTION
BUILDINGS
EQUIPMENT
FACULTY
ALUMNI

1902-1903

COLUMBUS
PUBLISHED BY THE UNIVERSITY
APRIL, 1902

DAYS AND DATES

1902

Summer Courses in Surveying	June 13 to	July	11.
Summer Courses in Shopwork	June 16 to	July	12.
Entrance Examinations (8 A. M.)	Monday, Tuesday,	September September	22. 23.
First Term begins — Registration Day	Tuesday,	September	23.
Lectures and Class-work begin	Wednesday,	September	24.
President's Annual Address	Friday,	September	26.
Meeting of Trustees	Wednesday,	September	24.
Thanksgiving Recess	Thursday, Friday,	November November	27. 28.
Latest Date for Filing Thesis Subjects	Monday,	December	15.
First Term ends	Wednesday,	December	24.

Christmas Vacation.

1903

Second Term begins — Registration Day	Tuesday,	January	6.
University Day	Sunday,	February	22.
Meeting of Trustees	Wednesday,	April	1.
Second Term ends	Friday,	April	3.

Spring Vacation.

Third Term begins — Registration Day	Wednesday,	April	8.
Field Day — Athletic Association	Saturday,	May	16.
Senior Class-work ends	Saturday,	May	23.
Competitive Drill — Cadet Battalion	Saturday,	May	23.
Memorial Day	Saturday,	May	30.
Latest Date for Presenting Thesis	Saturday,	June	13.
Final Examinations	Monday, to Friday,	June June	15. 19.
Latest Date for Filing bound Copy of Thesis	Friday,	June	19.
Baccalaureate Sermon	Sunday,	June	21.
Entrance Examinations (8 A. M.)	Monday, Tuesday,	June June	22. 23.
Class Day	Monday,	June	22.
Meeting of Trustees	Tuesday,	June	23.
Alumni Day	Tuesday,	June	23.
COMMENCEMENT	Wednesday,	June	24.
Summer Courses in Surveying	June 19 to	July	17.
Summer Courses in Shopwork	June 22 to	July	18.

Summer Vacation.

Entrance Examinations (8 A. M.)	Monday, Tuesday,	September September	21. 22.
First Term begins — Registration Day	Tuesday,	September	22.
Lectures and Class-work begin (all Colleges)	Wednesday,	September	23.
Meeting of Trustees	Wednesday,	September	23.
Annual Address by the President (11 A. M.)	Friday,	September	25.

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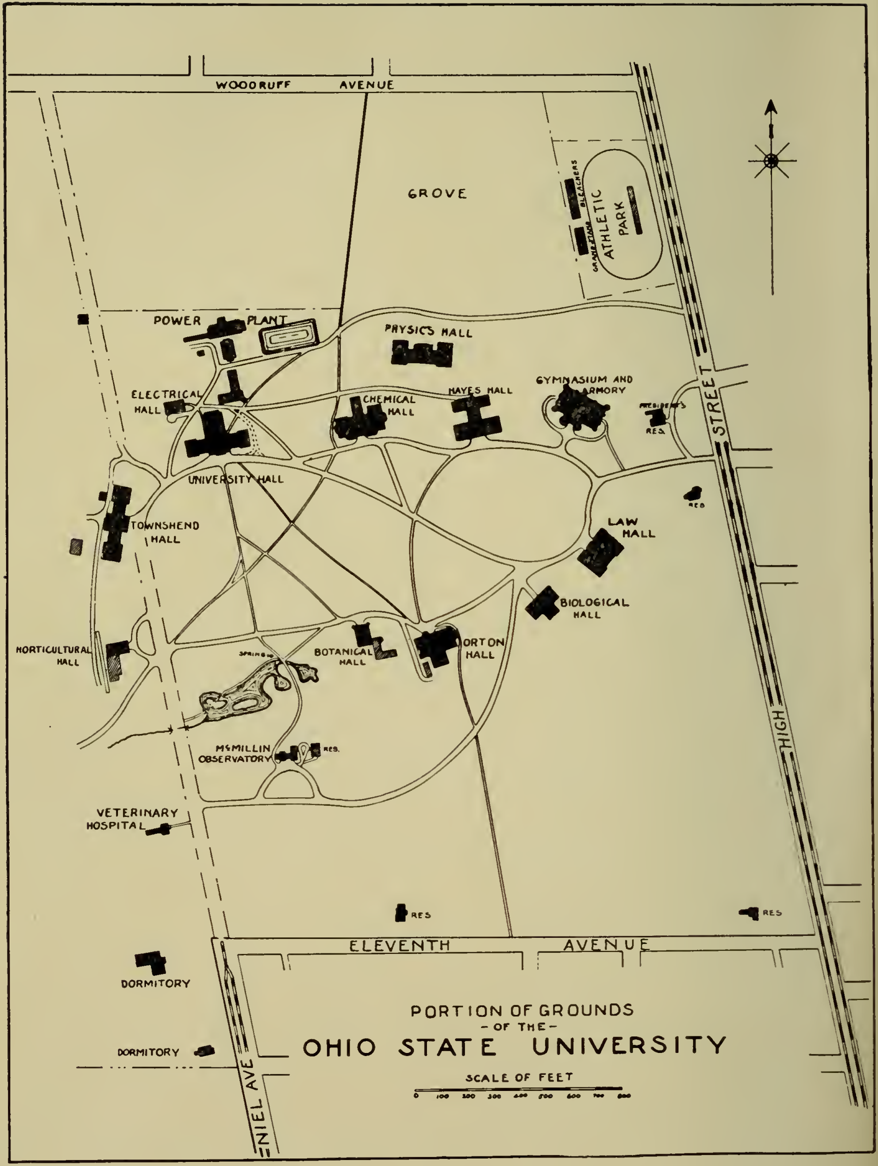


PORTION OF GROUNDS
- OF THE -
OHIO STATE UNIVERSITY

The Ohio State University

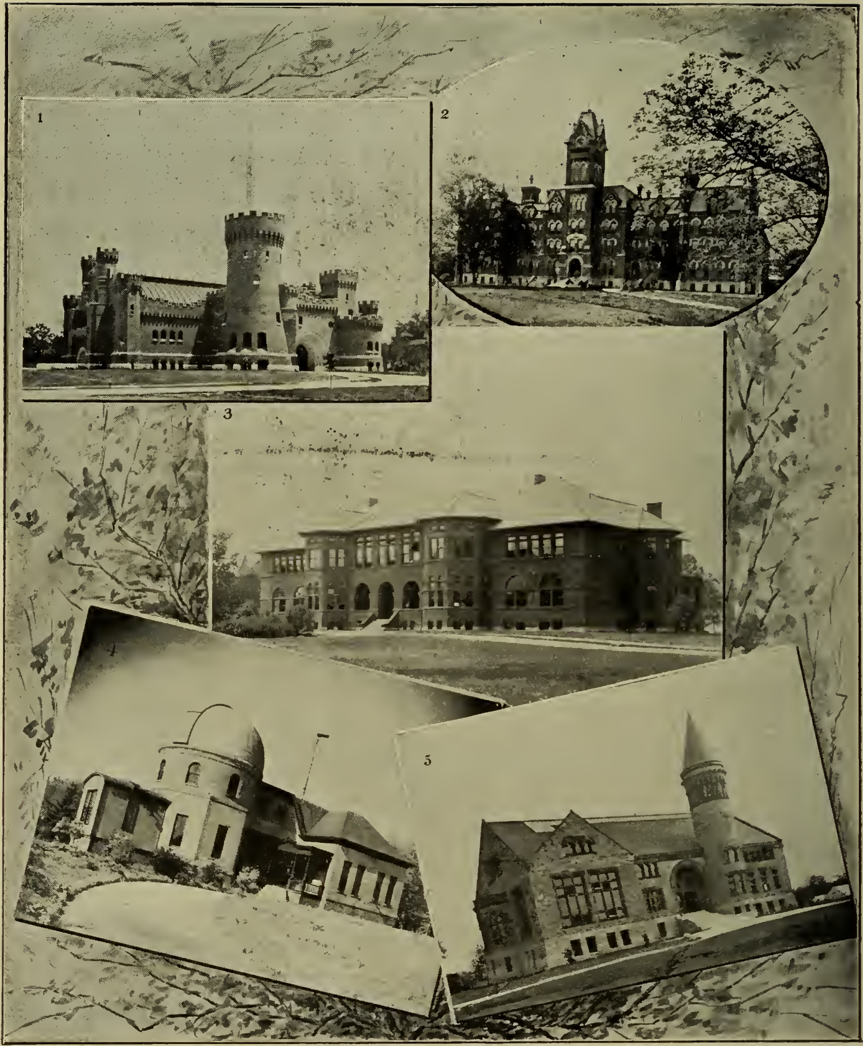
An act of Congress was passed July 2, 1862, whereby large grants of public land were set apart for the purpose of establishing "colleges where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such a manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In accordance with this act, the Ohio State University was founded by the State as a public institution of learning. The governing body of the institution is a Board of Trustees, appointed by the Governor of the State for terms of seven years, as provided in the law organizing the University. The original endowment has been supplemented, and the objects of the University promoted, by a permanent annual grant from the United States, under an act of 1890, by special appropriations of the General Assembly; and in 1891, by a permanent annual grant from the state, which grant was doubled by the Legislature of 1896. Through the aid which has been received from the United States and from the State it is enabled to offer its privileges, with a slight charge for incidental expenses, to all persons of either sex who are qualified for admission.

The University is divided into six colleges as follows:

The College of Agriculture and Domestic Science.
The College of Arts, Philosophy and Science.
The College of Engineering.
The College of Law.
The College of Pharmacy.
The College of Veterinary Medicine.

Each of the above named colleges is under the direction of its own Faculty, which has power to act in all matters pertaining to the work of the students of that particular college. The aim of the University is to give to the young men and women of Ohio the largest possible opportunity for both general and special training, in order to prepare them for the various duties of life.

The University is situated within the corporate limits of the city of Columbus, two miles north of the Union Depot and about



1—ARMORY AND GYMNASIUM 2—UNIVERSITY HALL
3—CHEMICAL HALL
4—EMERSON McMILLIN OBSERVATORY 5—ORTON HALL

three miles from the State Capitol. The University grounds consist of three hundred and thirty acres. The western portion, about two hundred acres, is devoted to agriculture and horticultural purposes, and is under the management of the College of Agriculture and Domestic Science. The eastern portion is occupied by the principal University buildings, twelve in number, the campus, athletic and drill grounds, a park-like meadow, and a few acres of primitive forest.

The College of Engineering

Since the inception of the University, the College of Engineering has maintained a vigorous and steady growth. To a large extent this growth represents the demand of the people from whom the University derives its support, for it has been the constant policy of the University to enlarge and foster each branch of educational work in response to every intelligent demand.

Yet it is true that the State has advanced and shaped public opinion by providing educational facilities somewhat in advance of public demand. Through its University it has established and built up a system of technical education which is more important than any other single agency in the development of the commercial and industrial interests of Ohio. The marvelous industrial progress made in this State and country in recent years is the best indication of the benefits which have already begun to accrue from the enlargement of technical training, and from its constant subdivision and expansion.

At present the College offers instruction in nine important fields of Engineering work. Covering these, the following four year courses of study are given:

1. *Architecture*, leading to the degree of Civil Engineer in Architecture (C. E. in Arch.). Established in 1900.
2. *Ceramics*, leading to the degree of Engineer of Mines in Ceramics (E. M. in Cer.). Established in 1896.
3. *Chemical Engineering,* leading to the degree of Bachelor of Science in Chemical Engineering (B. Sc.). Established in 1902.
4. *Civil Engineering,* leading to the degree of Civil Engineer (C. E.). Established in 1873.

5. *Electrical Engineering,* leading to the degree of Mechanical Engineer in Electrical Engineering (M. E. in E. E.). Established in 1889.

6. *Industrial Arts,* leading to the degree of Bachelor of Science in Industrial Arts (B. Sc.). Established in 1893.

7. *Manual Training,* leading to the degree of Bachelor of Science in Industrial Arts (B. Sc.). Established in 1893.

8. *Mechanical Engineering,* leading to the degree of Mechanical Engineer (M. E.). Established in 1879.

9. *Mining Engineering,* leading to the degree of Engineer of Mines (E. M.). Established in 1878.

The following short courses do not lead to degrees, but students completing them are furnished with formal certificates setting forth the work they have accomplished:

10. *Clay-working*, two years. Established in 1894.

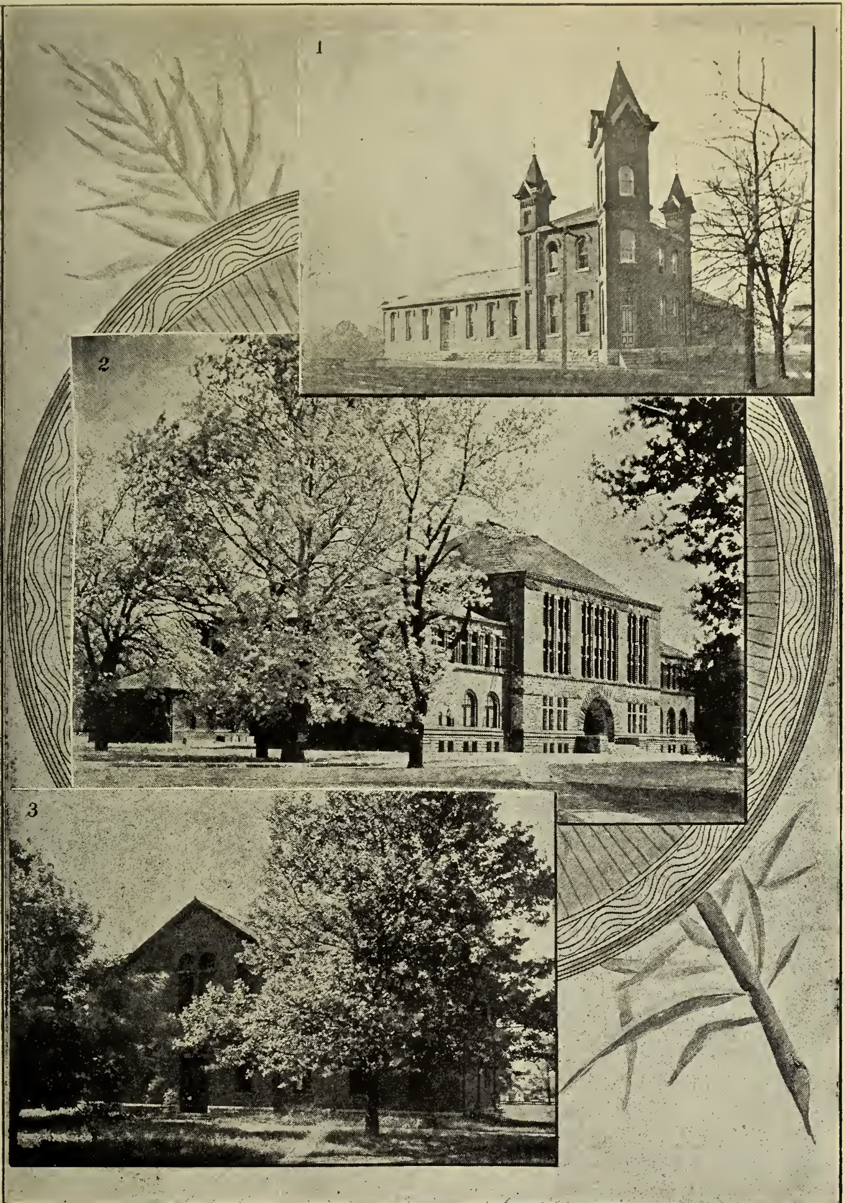
11. *Industrial Arts and Shopwork,* two years. Established in 1896.

12. *Mining,* two years. Established in 1887.

The instruction necessary to the completion of these various courses of study is given in twenty-one different departments, under eighty-four professors and assistants. In addition, in some of the courses in this College elective work is offered, which may be taken from any of the thirty-seven departments of the University.

The various departments directly connected with the College of Engineering, occupy about two-thirds of Chemical Hall, nearly the whole of Hayes Hall, the whole of the Mechanical and Electrical buildings, portions of Orton Hall and of the main University building. The equipment for teaching technical and scientific subjects is, in the main, excellent, and in some departments is exceptional. In all departments the annual increase in apparatus and facilities is rapidly making the equipment more perfect and complete.

The Library of the University, consisting of about 44,000 volumes, is able to fill the demands of the Engineering students for the most important treatises in their respective fields of science.



1—MECHANICAL HALL
2—HAYES HALL
3—ELECTRICAL BUILDING

IN MEMORIAM

CHRISTOPHER NEWTON BROWN

Christopher Newton Brown, eldest son of J. R. C. Brown, was born on a farm in Brown County, Ohio, March 21, 1858, where his childhood was passed. In 1871 his father, who was a surveyor and civil engineer, removed to Ironton, Ohio, taking with him the boy, then 13 years old.

Here young Brown completed his course in the high school and was then taken into active engineering field work by his father, who had built up a large practice and had become city engineer and county surveyor.

The district in which he was employed was notable. It still possesses the greatest unbroken areas of forest in this state, and was then in the heydey of its great charcoal iron industry.

His ability soon became so apparent that his father decided to give him the advantage of better training, and in 1876 he was sent to the Ohio State University, where he made an honorable record as a faithful, energetic and capable student, beloved by his fellows and respected by his instructors. He left before graduation to accept a position, but had already completed the technical work of his course with such credit that in 1883, when the growth of the Civil Engineering course required additional teaching force, he was called back, as instructor in that work.

His rise in the University has been steady. Assistant, Assistant Professor, Associate Professor, and Professor followed in turn, until in 1901, his colleagues bestowed upon him the highest honor in their gift, that of Dean of the College of Engineering, the duties of which position he was discharging with exceptional ability and success at the time of his untimely death.

Professor Brown's public services have grown side by side with his advancement in University work. He first became an assistant on the Ohio Geological Survey in 1882, and in 1892 he occupied the position of chief of field work. His reports are models of conciseness and accuracy. While in the employ of the War Department in 1899, he made a reconnoissance of the mineral wealth of the Big Sandy Valley in Kentucky, which won the highest encomiums of his employers. He was Chairman of the Sewer Commission of Columbus in 1900, in which position his clearness of comprehension and his grasp of the principles of sanitation enabled him to direct the attention of this body to the most fruitful lines of investigation open to them, and made their final report the starting point from which all future suc-

Engraved by C. A. Wright, Phila

C. N. Brown.

cessful work must proceed. In 1901 the Governor of Ohio appointed him as his representative in supervising the Topographical Survey, made by the State and U. S. Geological Survey working in coöperation. His fine acquirements and early experience enabled him to yield a service to the people of his state in this connection, which no other man in Ohio could have done.

His short, but fruitful life was brought to a sudden close on March 6th, 1902. For years, he had been working with unexampled concentration and energy. Endowed by nature with a magnificent physique, which his early life had developed to the full, he was able to perform with ease an amount of labor which few men dare undertake. But, his unselfish devotion to his profession, his Department, his College and his University made him respond to every call, and thus to exceed the possible limits of human endurance. Almost without warning, he was stricken with nervous prostration, which failed from the first to respond to treatment. He sank rapidly into unconsciousness and passed away in that condition.

Professor Brown's claims to an honored memory are many. As an engineer, he was exceedingly sound and judicial, uniting a fine knowledge of the literature of his profession, with the power to safely carry engineering conceptions into realities. As a teacher, he was luminous and clear in exposition, but thorough and even exacting in his requirements. He abhorred poor or inaccurate work, and would not tolerate it in his students. Nevertheless, his devotion to their best interests was so apparent that he won their regard and confidence in a most unusual degree.

As an executive officer, he was tactful, yet vigorous; rigid in his discipline, yet kind. He was exceedingly ambitious for his College, yet patient in disappointment and delay. His heart was bound up in its success, and he gave his life for its advancement as truly as ever soldier for his country.

But it is to him as a man that the highest tribute must be paid. His nature was essentially wholesome, and unconsciously brought under its sway both associates and students. His modesty was as charming as his acquirements were unusual. He loved truth and hated sham as few men could, and the character formed by his influence in the hundreds of young men who passed under his hands is the best and grandest monument this engineer has builded. The very tragedy of such an ending to such a noble and inspiring life will even more indelibly stamp his name and the memory of his deeds into the life of his University and his State.

Corps of Instruction

REV. WILLIAM OXLEY THOMPSON, D. D., LL. D......University Grounds
President of the University.

*C. NEWTON BROWN, C. E., Dean..........................1343 Forsythe Avenue
Professor of Civil Engineering.

NATHANIEL WRIGHT LORD, E. M...................338 West Eighth Avenue
Professor of Metallurgy and Mineralogy and Director of the School of Mines.

SIDNEY AUGUSTUS NORTON, Ph. D., LL. D...........363 East Town Street
Emeritus Professor and Lecturer in General Chemistry.

STILLMAN W. ROBINSON, C. E., D. Sc...................1353 Highland Street
Emeritus Professor of Mechanical Engineering.

BENJAMIN FRANKLIN THOMAS, Ph. D....................University Grounds
Professor of Physics.

GEORGE WELLS KNIGHT, Ph. D.......................169 West Eleventh Avenue
Professor of American History and Political Science.

ROSSER DANIEL BOHANNAN, B. Sc., C. E., E. M..16th and Indianola Avenues
Professor of Mathematics.

ERNST AUGUST EGGERS................................190 West Eleventh Avenue
Professor of the Germanic Languages and Literatures.

BENJAMIN LESTER BOWEN, Ph. D.......................775 East Broad Street
Professor of the Romance Languages and Literatures.

JOSEPH VILLIERS DENNEY, B. A.......................230 West Tenth Avenue
Professor of Rhetoric and the English Language.

EDWARD ORTON, Jr., E. M., Dean-elect......................The Normandie
Professor and Director of the Department of Clayworking and Ceramics.

WILLIAM T. MAGRUDER, M. E..................................191 King Avenue
Professor of Mechanical Engineering.

WILLIAM McPHERSON, Jr., D. Sc., Ph. D...............University Grounds
Professor of Chemistry.

JOSEPH NELSON BRADFORD, M. E.....................54 West Tenth Avenue
Professor of Architecture and Drawing.

CLARENCE P. LINHART, M. D.................................The Vendome
Professor of Physical Education and Director of the Gymnasium.

---

* Died March 6, 1902.

HENRY CURWEN LORD, B. Sc.................................University Grounds
Professor of Astronomy and Director of the Emerson McMillin Observatory.

FREDERICK CONVERSE CLARK, PH. D.......................1634 Neil Avenue
Professor of Economics and Sociology.

FRANK EDWIN SANBORN, S. B., SECRETARY..........303 West Eighth Avenue
Professor and Director of the Department of Industrial Arts.

FRANK ARNOLD RAY, E. M....................................137 King Avenue
Professor of Mine Engineering.

GEORGE L. CONVERSE, CAPTAIN U. S. A. (Retired)...........398 Oak Street
Professor of Military Science and Tactics.

EMBURY ASBURY HITCHCOCK, M. E................380 West Eighth Avenue
Professor of Experimental Engineering.

FRANCIS CARY CALDWELL, B. A., M. E................401 West Sixth Avenue
Professor of Electrical Engineering.

CHARLES SMITH PROSSER, M. S........................114 West Tenth Avenue
Professor of Geology.

JOHN ADAMS BOWNOCKER, D. Sc.............................1594 Neil Avenue
Professor of Inorganic Geology and Curator of the Museum.

ALFRED DODGE COLE.....................................45 West Eleventh Avenue
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CHRISTOPHER ELIAS SHERMAN, C. E.........................772 Oak Street
Professor of Civil Engineering and Acting Head of Department.

ALBERT HENRY HELLER...1249 Neil Avenue
Professor of Civil Engineering.

OLIVE B. JONES..53 Eleventh Avenue
Librarian.

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THOMAS EWING FRENCH, M. E.........................1458 Worthington Street
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FRANK HARVEY ENO..........960 North Fourth Street
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Assistant Professor of Rhetoric and the English Language.

HERRICK CLEVELAND ALLEN, LL. B..........275 East Gay Street
Assistant Professor of Rhetoric and the English Language.

WILLIAM ABNER KNIGHT, M. E..........206 West Lane Avenue
Assistant Professor of Machine-Shop Practice.

FREDERICK ALAN FISH..........229 West Eleventh Avenue
Assistant Professor of Electrical Engineering.

FREDERICK KESTER, M. E. in E. E..........1473 Neil Avenue
Assistant Professor of Physics.

JAMES EDWARD HAGERTY, Ph. D..........212 West Tenth Avenue
Assistant Professor of Economics and Sociology.

THEODORE CLARKE SMITH, Ph. D..........169 West Eleventh Avenue
Assistant Professor of American History and Political Science.

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Assistant Professor of Mathematics.

THOMAS HARVEY HAINES, Ph. D..........307 West Sixth Avenue
Assistant Professor of Philosophy.

JOHN DAVIS BATCHELDER..........The Goodale
Assistant Professor of Romance Languages.

*ALONZO HUBERT TUTTLE, B. A..........215 West Tenth Avenue
Assistant Professor in American History.

HORACE JUDD, M. E.; M. Sc..........
Assistant Professor of Experimental Engineering.

WILLIAM HENRY RENCK..........910 West Rich Street
Instructor in Pattern-Making and Founding.

CHARLES PHILIP CROWE..........971 Highland Street
Instructor in Forging.

THOMAS KENYON LEWIS, B. Sc..........1293 Dennison Avenue
Instructor in Drawing.

EDWARD EVERETT SOMERMEIER, G. Ph..........1590 Neil Avenue
Instructor in Metallurgy and Mineralogy.

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* Absent on leave.

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ALBERT VICTOR BLEININGER...........................312 West Seventh Avenue
Instructor in Ceramics.

JOSEPH HENRY VOSSKUEHLER.............................54 West Tenth Avenue
Instructor in Drawing.

BERTHOLD AUGUST EISENLOHR........................380 West Eighth Avenue
Instructor in German.

DON CARLOS HUDDLESON, G. PH..........................292 Fifteenth Avenue
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GEORGE WASHINGTON RIGHTMIRE........................216 East Town Street
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J. WARREN SMITH...1422 Oak Street
Lecturer on Meteorology.

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Assistant in Civil Engineering.

†SARAH BARROWS...85 West Tenth Avenue
Assistant in German.

MARION WILSON MUMMA, B. Sc...
Assistant in Chemistry.

†CLARENCE PHILANDER LINVILLE, B. Sc....................1497 Neil Avenue
Fellow in Chemistry.

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†JOHN FRANCIS TRAVIS, B. A............................239 West Tenth Avenue
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†HARRY HANCE..1093 East Long Street
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GRACE PITTS ....309 East Gay Street
Fellow in Economics and Sociology.

†C. S. VAN DYKE...202 West Eighth Avenue
Fellow in Industrial Arts.

ANNA E. WILLIAMS...35 King Avenue
Fellow in Rhetoric and English Language.

CLARA EWALT ....
Fellow in Rhetoric and English Language.

---

* Resigned.

† Term expires June 30, 1902.

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Fellow in Rhetoric and English Language.

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Student Assistant in Electrical Engineering.

WILBERT BOBB SKIMMING............................175 West Frambes Avenue
Student Assistant in Astronomy.

LUCIAN SHAW ....
Student Assistant in Drawing.

....
Student Assistant in Mine Engineering.

....
Student Assistant in Physics.

ALBERT FREEMAN HALL.............. ....1051 Highland Street
Machinist, Department of Mechanical Engineering.

JOHN PATTERSON COVAN................. .. ..500 West Sixth Avenue
Machinist, Department of Electrical Engineering.

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†|Term expires June 30, 1902.

Courses of Study

All engineering education is based on the constant use of the fundamental sciences, mathematics, physics and chemistry, supplemented by training in the art of expression, both by language and by drawing. It naturally follows therefore that all engineering courses start from a common point, proceed side by side for a time, but specialize and subdivide more and more as they progress toward completion, until in the last year they present but little work in common.

Further, it is very commonly the case with young men entering college for a technical education, that they are following ambitions not founded on any knowledge of their own natural aptitudes or capacities, and that they are in no way prepared to make a wise or final selection of their life work at that time.

For the two foregoing reasons, the first years of each of the engineering courses leading to a degree, are made identical throughout. The student is enrolled as a "First-year Engineer." His selection of the course he wishes to pursue is deferred to the opening of his second year, by which time he has become acquainted to some extent with University standards and methods, with the scope of the various courses offered, and with his own tastes and powers.

FIRST YEAR

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Term	Credit hours	Second Term	Credit hours	Third Term	Credit hours
Mathematics (31) Algebra.	5.	Mathematics (32) Trigonometry.	5.	Mathematics (33) Analytics.	5.
Chemistry (7) Inorganic.	5.	Chemistry (7) Inorganic.	5.	Chemistry (12) Qualitative Analysis.	4.
Modern Language French, Ger. or Spanish.	4.	Modern Language French, Ger. or Spanish.	4.	Modern Language French, Ger. or Spanish.	4.
Rhetoric (1) and (21) Composition.	2½.	Rhetoric (1) and (21) Composition.	2½.	Rhetoric (1) and (21) Composition.	2½.
Drawing (1) Freehand.	2.	Drawing (1) Freehand.	2.	Drawing (2) Lettering.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Drill.	

SUMMER TERM IN SHOPWORK.

Students electing courses named below are required to take Shopwork courses in the summer term as follows:

Chemical Engineering — Shopwork (7) and (11), at the close of the first or second year.

Electrical Engineering — } Two from Shopwork (4), (7) and (11), at the close of
Mechanical Engineerihg — } the first year.

COURSE IN ARCHITECTURE

This course is designed to produce men who unite a thorough knowledge of those phases of engineering which deal with the materials and methods of architectural construction, and a special training in appropriate and harmonious use of form, color, and decorative design.

Recent years have developed types of buildings without precedent in the history of architecture, in which the amount of unencumbered, internal space obtained is as remarkable as the safety, durability, comfort and healthfulness of the buildings themselves. The ends obtained in the modern, tall, steel-skeleton building would have been utterly impossible in the solid masonry structures of the past.

Mathematics, the foundation for the solution of constructive problems, is studied for two years, and in the technical work of the course its use is constant.

Drawing is an important factor in the education of the architect, and includes that of the engineer and of the artist, being controlled partly by considerations of fact and partly by those of appearance. It extends in some form throughout the course, including freehand, mechanical, descriptive geometry, shades and shadows, perspective, pen drawing, brush-drawing in color, clay-modeling; and is applied in the architectural designing.

The engineering technical work includes: strength of material, testing materials, stresses in trusses and framed structures, masonry, mortars, electricity and surveying.

The rapidly increasing application of electricity in modern buildings requires architects and superintendents of buildings to know the fundamentals of electric construction and, at least, the common sources of danger in its use. To meet this need the course in physics is supplemented with two terms of electrical engineering. For similar purposes in the safe installation of water and steam piping, elevators, and power, a laboratory course in experimental mechanical engineering succeeds the regular course in mechanics and strength of materials.

The history of architecture, necessary to broaden the student's architectural knowledge, is given a prominent place, and is freely illustrated by a selected set of lantern slides.

Decoration and ornament comprise a study of the decorative details of the different styles of architecture, both in carved ornament and decorative color.

The technical architecture includes: designing architectural structures complete, specifications, heating, ventilating, plumbing, estimates, fire-proofing, superintendence and contracts.

See also pages 41-43.

COURSE IN ARCHITECTURE

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	5.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y Magnetism.	3.	Physics (2) Light, Sound.	3.
Architecture (9) Hist'y of Architecture.	3.	Architecture (10) Hist'y of Architecture.	3.	Architecture (11) Hist'y of Architecture.	3.
Architecture (12) Detail Drawing.	2.	Architecture (13) Detail Drawing.	2.	Architecture (14) Detail Drawing.	2.
Drawing (14) Pen Drawing.	2.				
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Third Year

Mathematics (51) Statistics.	5.	Mathematics (52) Strength Mat'ls, Kinet's	5.	Mathematics (53) Kinetics; Hydraulics.	5.
Architecture (15) Designing.	4.	Architecture (16) Designing.	2.	Architecture (17) Designing.	4.
Drawing (7) Photography.	2.	Drawing (12) Clay Modeling.	2.	Drawing (12) Clay Modeling.	2.
Elec. Eng'ring (6) Lectures.	2.	Elec. Eng. (6) and (7) Lectures and Lab.	4.		
Architecture (5) Decorations, etc.	3.	Civil Eng. (6) Stereotomy.	4.	Civil Eng. (19) Trusses.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.

Fourth Year

Architecture (18) Designing.	4.	Architecture (4) Specifications.	2.	Architecture (6) Estimates and Supt.	4.
Civil Eng. (15) Masonry.	5.	Architecture (7) Heating, Vent., etc.	5.	Architecture (19) Designing.	4.
Mech. Eng. (23) Materials of Const.	4.	Architecture (8) Designing.	5.	Architecture (20) Thesis.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Civil Eng. (21) Surveying.	3
		Drawing (18) Color Work.	3.	Drawing (19) Color Work.	2.

THESIS

COURSE IN CERAMICS

The ceramic industries include, according to the classification here adopted, those industries in which the production and utilization of natural and artificial silicates is the end in view, viz., clayware, glass and cement. These three industries constitute a natural division of chemical technology and though they are intimately connected with the field of the metallurgist on the one hand, and with the manufacturing chemist on the other, still they have an individuality which makes their study and exploitation as a separate field of industrial science advisable.

The work which the ceramic engineer must be prepared to supervise is broad and varied. In the preparation of any product of uniform physical and chemical qualities from the crude rocks and minerals of the earth's surface, a knowledge of chemistry is the foremost essential, and no one without the training of the chemical laboratory, in which an account must be rendered for everything, can hope to attain the highest mastery in this subject. In this course, therefore, chemistry forms an important part of the training, beginning with the first term and continuing through three years of purely chemical work, followed by a year of practice in the application of chemistry to ceramic operations.

But the ceramic engineer will be subjected to other calls on his resources. He must be able to intelligently search for and locate deposits of the crude mineral supplies which he needs, and having found them, he must be able to win them safely and economically, whether on the surface or under ground in mines. To this end, the student is given training in mineralogy, geology, both historic and economic, metallurgy, so far as it pertains to fuels and iron, and mine engineering.

Also, like the metallurgist, the ceramist deals with reagents and performs chemical reactions on a gigantic scale; and in the winning of the materials, their mechanical preparation, their economic handling and storage, their manufacture into useful forms, and in the construction of buildings, machinery, kilns and furnaces for these purposes, the knowledge and resources of the trained engineer must constantly re-enforce those of the chemist and geologist. Accordingly the course includes a vigorous drill in mathematics, physics, mechanics, strength of materials, drawing, drafting, shopwork and construction. In addition, at least one year of some modern language, preferably German, and two years in the correct use of the English language are required.

See also pages 46-50.

COURSE IN CERAMICS

NOTE -- The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Ceramics (1) Laboratory.	5.	Ceramics (2) Laboratory.	5.	Ceramics (3) Laboratory.	5.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Third Year

Mathematics (51) Statics.	5.	Mathematics (52) Strength Mat'ls, Kinet's.	5.	Mathematics (53) Kinetics; Hydraulics.	5.
Ceramics (4) Raw Materials.	5.	Ceramics (5) Clay Products.	5.	Ceramics (6) Clay Products.	5.
Mine Eng. (4) Mine Surveying.	5.	Ceramics (7) Adv. Chem. Lab.	5.	Metallurgy (2) Mineralogy.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
				Shopwork (11) Forging.	3.

Fourth Year

Ceramics (9) Manf. of Bodies.	5.	Ceramics (10) Glasses and Glazes.	5.	Ceramics (11) Enamels, Colors.	5.
Metallurgy (4) Fuels and Iron.	5.	Ceramics (12) Cement.	5.	Ceramics (15) Thesis Work.	5.
Shopwork (4) Chipping and Filing.	3.	Ceramics (17) Ceramic Const.	4.	Mech. Eng. (25) Laboratory.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Drawing (7) Photography.	2.

THESIS

COURSE IN CHEMICAL ENGINEERING

This course has been prepared to meet the growing demand for trained men in the numerous industries which are based upon chemical processes or employ them prominently in their work, and which are not included in the fields of metallurgy and ceramics. Among such may be mentioned the manufacture of acids, alkalis, salts, chemical reagents, paints, colors, dyes, bleaching powders, soaps, glue, gelatine, glycerine tanning compounds, starch, sugar, dextrine, glucose, alcohol, ferments, preservatives, antiseptics, fertilizers, pyrotechnics, matches and many others.

In accordance with the prevailing views, both of manufacturers and of technical instructors, the Chemical Engineering Course has been somewhat extended along the mechanical side, and the work in chemistry has been planned to afford a thorough drill in general chemistry. On this foundation the details of any industrial application of chemical principles can be readily mastered.

The student begins his chemical work in the first year with general inorganic chemistry and qualitative analysis. This is followed in the second year by a course in quantitative analysis and a continuation of general chemistry; and in the third year by metallurgical analysis and organic chemistry. In the fourth year a course in industrial processes with laboratory work in inorganic preparations is required, together with a term's work each in sanitary analysis of water and air, and in the elements of the ceramic industry, and two terms in physical chemistry. In addition to this several options are offered in metallurgy, agricultural chemistry and mechanical engineering.

On the engineering side, mathematics is carried through three years; drawing, including free hand, mechanical and technical, is also required through three years. Physics is required in the first two years, mechanics in the third and machine designing in the fourth. A term in the electrical laboratory forms a part of the fourth year's work.

Two years of English and a year of either French or German is required of all engineers. In view of the large chemical literature in the German language all students in the Chemical Course will find it almost necessary to select the German.

See also pages 51-53.

COURSE IN CHEMICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

Shopwork Courses (7) 3 and (11) 3 are to be taken in Summer Term, at the end of the First or Second Year.

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.
Chemistry (21) Inorganic.	2.	Chemistry (21) Inorganic.	2.	Chemistry (21) Inorganic.	2.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.		
Chemistry (31) Stoichiometry.	2.			Metallurgy (2) Mineralogy.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Third Year

Chemistry (8) Organic.	5.	Chemistry (9) Organic.	5.	*Chemistry (9) Organic.	5.
Metallurgy (5) Laboratory.	5.	Metallurgy (6) Assaying.	5.	*Metallurgy (5) Laboratory.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Mathematics (51) Statics.	5.	Mathematics (52) Strength Mat'ls; Kinet's.	5.	Mathematics (53) Kinetics; Hydraulics.	5.
Drawing (21) Technical.	2.	Drawing (22) Technical.	2.	Drawing (23) Technical.	2.
				Mech. Eng. (32) Power Plants.	5.

* Students are to elect either Chemistry (9) 5, or Metallurgy (5) 5.

Fourth Year

Chemistry (32) Industrial.	4.	Chemistry (32) Industrial.	4.	Chemistry (15) Sanitary.	4.
Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (19) Machine Design.	5.
Elec. Eng. (6) Lectures.	2.	Chemistry (30) Physical.	3.	Chemistry (30) Physical.	3.
Elec. Eng. (7) Laboratory.	2.	*Mech. Eng. (35) Laboratory.	5.		
*Metallurgy (4) Fuels and Iron.	5.	*Metallurgy (4) General.	5.	Ceramics (16) General Principles.	5.
*Ag. Chemistry (4) Laboratory.	5.	*Ag. Chemistry (4) Laboratory.	5.		

* Students are to elect Metallurgy (4), two terms; Agricultural Chemistry (4), two terms (see General Catalogue for description of course); or Metallurgy (4) first term, and Mechanical Engineering (35).

COURSE IN CIVIL ENGINEERING

The field of the civil engineer comprises mensuration or surveying and also construction in its broad sense.

While many of the departments have grown into distinct professions, civil engineering, the parent stem, remains with more and larger opportunities than ever before.

As all the problems of the engineer involve the principles of the sciences, these form the ground-work of the course, and while mathematics is the foundation, occupying three years either alone or in its applications, physics, chemistry, geology and astronomy are each given an important place.

The technical work embraces instruction in free hand and mechanical drawing, surveying, and map-making, steel bridges and buildings,, masonry structures, roads, streets, railways, water-supply, sanitary engineering, the testing of structural materials, and the fundamentals of steam and electrical machinery.

The drawing extends practically through the entire four years. It is designed to fit men to take responsible positions as draftsmen.

The work in surveying includes three terms' work in the text-book and field work on the campus. At the end of the second year, and again at the end of the third year, the surveying classes are taken into camp for four weeks in a rough country and devote their entire time to surveying. It is expected to fit young men for at once taking charge of a field engineering corps.

Two terms' work is required in steel construction, the first being devoted to the computation of stresses, and the second to the designing, detailing and drawing of roofs, bridges, buildings and other framed structures. The practice of the best bridge shops is followed. The term's work in masonry structure treats of building materials, abutments and piers, retaining walls, dams and masonry arches. Roads, street and railway construction and maintenance are treated at length in text books and lectures. A term is devoted to each of the subjects of water supply and sanitary engineering.

All through the technical work, frequent references are made to periodicals, transactions of engineering societies and other works on engineering, and the student is required to become familiar with them.

The object sought in all the technical work is to give a thorough training in the theory of subjects, to show how these are applied in practice and to give as much drill as possible in office and field methods.

See also pages 54-58.

COURSE IN CIVIL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	5.	Drawing (3) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y. Magnetism.	3.	Physics (2) Light, Sound.	3.
Civil Eng. (1) Land Surveying.	6.	Civil Eng. (4) Topog. Drawing.	4.	Civil Eng. (2) Railroad Surveying.	6.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

SUMMER COURSE

Civil Engineering (22) 4 weeks, of 6 days per week. Field work in land and railroad surveying.

Third Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mathematics (51) Statics.	5.	Mathematics (52) Strength Mat'ls; Kinet's.	5.	Mathematics (53) Kinetics; Hydraulics.	5.
Civil Eng. (3) Topog. Surveying.	4.	Civil Eng. (24) C. E. Drawing.	5.	Civil Eng. (7) Bridge Stresses.	5.
Civil Eng. (16) Roads and Streets.	5.	Civil Eng. (6) Stereotomy.	4.	Drawing (7) Photography.	2.
Astronomy (2) Mathematical.	3.	Astronomy (2) Mathematical.	3.	Astronomy (2) Mathematical.	4.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.

SUMMER COURSE

Civil Engineering (23) 4 weeks, of 6 days per week. Field work in railroad and topographical surveying.

Fourth Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Civil Eng. (8) Bridge Designing.	5.	*Civil Eng. (17) Railways.	5.	Civil Eng. (18) Water Supply.	5.
		*Civil Eng. (25) Adv. Bridge Work.	5.		
Civil Eng. (15) Masonry.	5.	Civil Eng. (14) Cement Testing.	2.	Civil Eng. (10) Sanitary Eng.	5.
Elec. Eng (6) Lectures.	2.	Elec. Eng. (6 and 7) Lectures and Lab.	4.		
		Mech. Eng. (17) Laboratory.	3.	Mech. Eng. (25) Laboratory.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.		

THESIS

* Students are to elect either C. E. (17) or C. E. (25).

COURSE IN ELECTRICAL ENGINEERING

The object of this course is to give such training as shall enable the graduate to successfully take up practical work in those branches of engineering in which electricity plays the principal part. In general, the training needed for this purpose is the same as that of the Mechanical Engineer, except that the student need have only a general familiarity with other methods of power generation and utilization, and must, of course, make a very thorough study of the subject of electricity. Consequently, the first two years of the two courses are alike, except as regards shopwork and physics.

A considerable part of the first two terms of the third year is occupied by a thorough training in elementary electrical engineering measurement, such as currents, voltage, capacity, inductance, magnetic flux, etc. This work is given in the physics department (see Physics, Course 6, page 94). The third year also includes training in mechanics, mechanism, machine design, and strength of materials, the latter taught both in the class-room and in the laboratory. In the last term the study of steam machinery is commenced. Work on dynamo machinery is begun in the class-room in the second term, and followed up during the third term in the laboratory.

In the last year of the course, engines and boilers are studied during the first term in the class-room, and during both the first and second terms in the laboratory. Instruction in electrical engineering forms the main part of the work of this year. It is carried on in the class-room, drawing room, and laboratory, and includes besides a thorough course in alternating current machinery, courses on power transmission and upon the application of electricity. Throughout the whole of this year a part of the work is elective, and is chosen by the student subject to the approval of the head of the department. The end which is kept most in view, is the training of the student to think for himself, and to solve for himself the problems of the engineer.

Work in the class-room is done partly by text book and partly by lecture and recitation, preference being given to the former, where satisfactory books are available. The work is illustrated by the use of the projection lantern, diagrams and illustrative apparatus. Much stress is laid on the solution of numerical problems by the student. In the drawing room, designs are made of dynamo machinery of different kinds, transformers, house wiring, transmission, etc., the work here being as far as practicable based on the theoretical conclusions reached in the class and laboratory. The equipment is good and is increasing.

See also pages 65-69.

COURSE IN ELECTRICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

SUMMER TERM

Students are required to take *two* of the following Courses in Shopwork in the Summer Term at close of First Year: Shopwork (4), (7) and (11).

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (*)	3.	Shopwork (13) Machine Work.	3.	Physics (5) Laboratory.	4.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

* Students are required to take the Shopwork not assigned them in the Summer Term, i. e., Shopwork (4), (7) or (11).

Third Year

Mathematics (51) Statics.	5.	Mathematics (52) Strength Mat'ls, Kinet's.	5.	Mathematics (53) Kinetics, Hydraulics.	5.
Physics (6) Laboratory.	5.	Physics (6) Laboratory.	5.	Mech. Eng. (32) Power Plants.	5.
Physics (4) Elect'y, Magnetism.	3.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng (28) Laboratory.	2.
Shopwork (14) Machine Work.	3.	Elec. Eng (8) D. C. Machinery.	4.	Ind. Arts (7) Mach. Design.	3.
Drawing (5) Technical.	3.			Elec. Eng. (9) Laboratory.	4.

Fourth Year

Elec. Eng. (10) A. C. Machinery.	3.	Elec. Eng. (10) A. C. Machinery.	3.	Elec. Eng. (13) Applications.	5.
Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (14) Designing.	4.	Elec. Eng. (14) Designing.	4.
Mech. Eng. (33) Engines and Boilers.	5.	Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (11) Laboratory.	3.
Mech. Eng. (29) Laboratory.	3.	Elec. Eng. (12) Transmission.	2.		
		Mech. Eng. (30) Laboratory.	2.		
*Elective	3–5.	*Elective	3–5.	*Elective	3–5.

THESIS

* Subject to the approval of the Professor of Electrical Engineering.

COURSE IN INDUSTRIAL ARTS

This course is designed for those who may desire to occupy positions in the various branches of manufacture, not as engineers, but as practical managers, superintendents or business men.

As the growth of engineering has brought about its subdivision into many special lines such as civil, mechanical, electrical, mining, and chemical engineering, and established special training for each, so the increase in size, importance and scope of the manufactures of the country has made it desirable to especially train young men with reference to filling positions of trust and responsibility in them: to so educate them that they can readily learn the treatment or processes in any special line of manufacture and be able to intelligently superintend: and that they can initiate and put into successful operation new industrial enterprises, or extend and improve old ones.

With this idea in view this course has been planned to give the student special training along industrial and business lines, together with a certain amount of general culture. There will be found in this course a large amount of science training by which the processes of manufacture based upon these laws may be more readily understood; practice in the different shops and in drawing so that a good working knowledge of such operations may be acquired as well as training given to eye and hand, and power of observation and thought along mechanical lines developed: studies into the principles and methods governing the production of the chief materials of construction, the different mechanical movements and their combination in machinery, the use of materials in various constructions, electrical machinery and steam power plants, together with laboratory practice: also the relations of capital and labor, the problems of trade, and the conduct of business enterprises.

This course is well adapted to meet the needs of those young men already employed in industrial pursuits at the machine or bench, who are ambitious to advance to positions of greater responsibility and influence. This course offers an excellent opportunity to such men: it gives them four years of earnest work under good instructors to direct and assist personally, and the advantages of laboratory work to supplement the theoretical bookwork. Those intending to take this course should first prepare themselves to meet the entrance requirements as given on page 75. Those unable to spend four years in this course will find on page 36 a short course requiring two years.

All choice of electives must be made in consultation with the head of the department and receive his approval.

See also pages 75-77.

COURSE IN INDUSTRIAL ARTS

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (2) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Economics (2) Industrial Society.	2.	Economics (3) Indus. and Fin. Hist.	2.	Economics (4) Transportation Problems.	2.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Third Year

Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping and Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Mech. Eng. (32) Power Plants.	5.
Economics (1) Elem. of Polit. Econ.	3.	Economics (1) Elem. of Polit. Econ.	3.	Economics (1) Elem. of Polit. Econ.	3.
		Mech. Eng (22) Timber and Masonry.	3.		

Fourth Year

Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Shopwork (17) Adv. Mach. Work.	3.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Civil Eng. (21) Surveying.	3.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Labortory.	2.		
Industrial Arts (3) Shop Equipment.	3.	Industrial Arts (3) Shop Appliances.	3.	Industrial Arts (3) Shop Management.	3.
Iudustrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.
Mech. Eng. (28) Laboratory.	2.	Mech. Eng. (29) Laboratory.	2.	Mech. Eng. (30) Laboratory.	2.
Economics (5) Immigration, Money.	2.	Economics (6) Railroads, Crises, etc.	2.	Economics (7) Labor and Capital.	2.

THESIS

COURSE IN MANUAL TRAINING

This course is designed for those students who wish to become teachers of manual training in the public schools of secondary grade or in the technical schools. Such manual training is based upon knowledge of the relation of the body and brain; its educational value is very great, and recognition of its importance is causing it to be put into more of the schools of the country each year. The advancement of manual training in the schools is retarded by one factor at least, and that is the lack of teachers suitably trained to instruct in its different branches. This course is planned to meet this demand. It is necessary that a teacher of manual training in our public schools be of the same high standard as his associates, in character, general culture, uplifting influence. He must possess knowledge of the methods of instruction, ability in the art of teaching; and coupled with these he must have skill in his technical lines. He must be familiar with the tools, materials and processes used, and acquainted with the different effects on his pupils of the training and work with these. He must understand that enlarged power and ability in the student is what he is seeking; that the pupil himself, and not the inanimate object used, is the real product of manual training.

As this course is a professional one, the studies found in it are those which will both broadly and specifically train for the end in view. There is a large amount of science work in physics and chemistry, which work is of importance on account of its fundamental character and the preparation it gives for teaching those subjects. The shopwork of the different kinds will furnish the necessary knowledge and the training of the hand, eye and brain; the drawing will give familiarity with that mode of expression of ideas. The industrial arts treat of mechanical movements and their application to machine tools. There is work in the subjects of electrical machinery and steam power plants that the teacher may be capable of dealing with the power used in his shopwork. The studies in the educational field will present the principles underlying education, the part which the different subjects have in the unfolding or development of the pupil, the laws of his development, so that he can deal intelligently with his pupils.

As this course is arranged the student completing the work will be ready for the teaching of manual training of the high school grade; of the drawing accompanying it; also of the science he may have chosen. Thus he may be able to accept a position in some school where manual training is not taught and can gradually introduce it as opportunity offers.

All choice of elective work must be made in consultation with the head of the department and receive his approval.

See also pages 75-77.

COURSE IN MANUAL TRAINING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Mak'g.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Education (1) Elem. Psychology.	3.	Education (1) Elem. Psychology.	3.	Education (1) Elem. Psychology.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Third Year

Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
History (1) U. S. Political.	3.	History (1) U. S. Political.	3.	History (1) U. S. Political.	3.
*Chemistry (20) Quantitative.	4.	*Chemistry (20) Quantitative.	4.	*Chemistry (20) Quantitative.	4.
*Chemistry (21) Physical.	2.	*Chemistry (21) Physical.	2.	*Chemistry (21) Physical.	2.
*Physics (5) Laboratory.	5.	*Physics (5) Laboratory.	5.	*Physics (5) Laboratory.	5.

* Students take either Chemistry (20) and (21) or Physics (5).

Fourth Year

Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Mech. Eng. (32) Power Plants.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Mech. Eng. (28) Laboratory.	2.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.		
Education (5) Science of Educ.	3.	Education (5) Science of Educ.	3.	Education (5) Science of Educ.	3.
Polit. Science (1) Polit. Inst. of U. S.	3.				
Electives	2–5.	Electives	5–7.	Electives	5–7.

THESIS

COURSE IN MECHANICAL ENGINEERING

Mechanical Engineering deals principally with the generation of power or effective energy from the forces of nature and the utilization of this power through mechanical devices. The fundamental science underlying this profession is physics, especially that part of physics relating to mechanics and heat, though mathematics is the medium by which these physical principles are made applicable to practical problems.

The training given in this course is designed to equip men witn such general and technical knowledge, that they can enter at once and with equal ease into positions in any of the numerous subdivisions of mechanical engineering, and adapting themselves to the needs of the situation, can rapidly acquire the experience which is essential to that particular work. And at the same time it must be noted that no one lacking this broad preliminary view of the profession as a whole, can ever expect to attain the highest skill in any one of its specialties.

The technical work of the course begins with physics, which is taught by a year's text-book course, supplemented by two terms of laboratory work. This is followed in turn by mechanics, mechanism, the strength of materials, bridge stresses, machine design, thermodynamics, prime movers, steam boilers, shop appliances, hydraulic machinery, and the metallurgy of fuel, iron and steel.

The theoretical principles of these subjects cannot be made real and practical to the student except by an extended system of laboratory courses. Three such are provided, in shopwork, drawing and experimental engineering, respectively. The shopwork course trains the student in those handicrafts in constant use in all mechanical industries, viz., forging, chipping and filing, carpentry, pattern-makng, foundry work, and the use of the principal metal-working machine tools.

The course in drawing includes free hand drawing, lettering, projection, descriptive geometry, shades, shadows, perspective and technical drawing, all leading up to the three terms of machine design which teach the student to use this drawing as one of the important tools of his profession.

The experimental engineering, coming in the last year of the course, gives the student opportunity to gain familiarity with boiler tests, determinations of the efficiency of steam power-plants, gas engines, hydraulic and refrigerating machinery, measurements of friction, losses of power in transmission, and many other important technical problems, and is of the greatest use to the student in enabling him to face practical work with confidence in himself.

See also pages 79-84.

COURSE IN MECHANICAL ENGINEERING

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

SUMMER TERM

Students are required to take *two* of the following Courses in Shopwork in the Summer Term at the close of the First Year: Shopwork (4), (7) and (11).

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	2.
Shopwork (3) Foundry.	2.	Physics (7) Laboratory.	2.	Physics (7) Laboratory.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Shopwork (*)	3.	Shopwork (*)	3.	Shopwork (13) Machine Work.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

* Students are required to satisfactorily pursue before the Third Term, Second Year, Shopwork Courses (4), (7), (9) and (11). In the First Term they will be assigned one of the two subjects not yet taken successfully, and in the Second Term the other; but Shopwork (7) must precede Shopwork (9).

Third Year

Mathematics (51) Statics.	5.	Mathematics (52) Strength Mat'ls; Kinet's.	5.	Mathematics (53) Kinetics; Hydraulics.	5.
Mech. Eng. (12) Laboratory.	2.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng. (3) Mechanism.	2.
Drawing (5) Technical.	3.	Mech. Eng. (22) Timber, Masonry.	3.	Drawing (7) Photography.	2.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Civil Eng. (19) Trusses.	5.
Shopwork (14) Machine Work.	3.	Shopwork (15) Adv. Mach. Work.	4.	Mech. Eng. (32) Power Plants.	5.
Mathematics (11) Diff. Equations.	1.				

Fourth Year

Mech. Eng. (33) Engines and Boilers.	5.	Mech. Eng. (34) Thermodynamics.	5.	Mech. Eng. (19) Machine Design.	5.
Mech. Eng. (27) Laboratory.	5.	Mech. Eng (14) Laboratory.	4.	Mech. Eng. (15) Laboratory.	3.
Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (21) Thesis.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Industrial Arts (5) Shop Appliances.	3.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.	Mech. Eng. (31) Hydraulic Machinery.	3.

THESIS

COURSE IN MINING ENGINEERING

The profession of mining engineering is peculiar in the wide range of work it covers. It involves two distinct fields; that of the engineer, presented in the locating, exploiting and operating of mining properties, and that of the chemist and metallurgist in the reduction of ores and the treatment of fuels, as in coke manufacture. A man may devote himself largely to either of these departments, but a competent understanding of both is essential to the successful designing and development of mining or metallurgical plants.

The course preparatory to such a profession must be a broad one, including a thorough training in general science, especially chemistry, mathematics, mineralogy and geology, as well as in the use of English, and, as far as possible, foreign languages.

With this as a foundation there must be given special instruction in the arts which are related particularly to mining and metallurgy, and which usually furnish the first employment to the graduate, such as drafting, surveying, technical chemical analysis and assaying. Experience has shown that these subjects can be so taught in college as to enable a man to be of use in the industry during the time in which he is acquiring that experience and judgment which are essential to his ultimate success.

Finally the advanced work of the profession must be fully treated. Such work naturally occupies the later years of the course, being necessarily preceded by the mathematics and the general science training. The course which follows has been framed on these general principles.

The third year is largely devoted to special professional studies. The work in metallurgy is extended and developed in special lectures on the metals, their properties and reduction, fuel, furnaces, refractory materials and the principles of slag formation and furnace charging. Fire assaying of gold, lead and silver ores is taught practically.

The engineering side of the course is developed in this year by training in the principles of construction, as given in mechanics, strength of materials and truss stresses. Surveying is taught by lectures, recitations and extended field practice.

In the fourth year of the course the problems of mine engineering and metallurgical constructions are developed in lectures covering the theory and practice of mine development and operation, furnace construction and design, etc., and are supplemented by practical work in the drafting room and by visits to accessible mines and metallurgical works for study and comparison.

See also pages 91-93.

COURSE IN MINING ENGINEERING

Note — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

(See page 17)

Second Year

First Term.	Credit hours	Second Term.	Credit hours	Third Term.	Credit hours
Drawing (3) Projections.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.
Shopwork (7) Woodwork.	2.	Shopwork (11) Forging.	2.	Metallurgy (2) Mineralogy.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Third Year

Mathematics (51) Statics.	5.	Mathematics (52) Strength Mat'ls; Kinet's.	5.	Mathematics (53) Kinetics; Hydraulics.	5.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) General.	5.	Metallurgy (3) Deter. Mineralogy.	5.
Mine Eng. (4) Mine Surveying.	5.	Metallurgy (6) Assaying.	5.	Civil Eng. (19) Trusses.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
		Mine Eng. (7) Surveying.	1.		

Fourth Year

Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Mech. Eng. (25) Laboratory.	5.
Metallurgy (8) Ore Dressing.	2.	Metallurgy (7) Metal. Construction.	3.	Mine Eng. (6) Plans and Specifications.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Drawing (7) Photography.	2.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.		
		Geology (7) Petrography.	2.		

THESIS

COURSES NOT LEADING TO A DEGREE

The following short courses are offered by the University, in the belief that they will meet the needs of a large class of young men who for any reason will not or cannot obtain the benefits of the thorough courses already described. The University recognizes that there are many valid reasons which may stand in the way of some, whose ability to receive and use the highest forms of education is without question, and it is thought that in extending opportunities for such training as will be available to these young men, the University is filling a longfelt want in the scheme of engineering education and is certain to grow into closer contact with the industrial life of the State.

No diploma is given to those who complete these courses, but a certificate is issued stating the list of studies which the student has taken in his course, and in which his work has been satisfactory.

The requirements for admission to these short courses are very much lower than for admission to regular collegiate work. It is clear that to reach the young men for whom these courses have been designed, it is necessary that the conditions of admission and attendance shall be shorn of every complication and that the opportunity extended shall be within the grasp of all, and with the minimum of formality or restriction. It is considered, however, that those who accept these opportunities are men, mature in character and steadfast in their purpose to gain sufficient technical education for their needs, and who are making a sacrifice of time at an age when time has begun to be precious.

The somewhat elementary character of some of the work of these courses may attract the attention of some, who as candidates for admission to regular collegiate work could not be admitted on account of their insufficient preparation. To all such students it is proper to state that these courses are in no sense designed as preparatory schools for those who desire ultimately to enter college, and it is not the purpose of the college to permit such use to be made of them. Therefore, every candidate for admission to the short courses, will be expected to satisfy the Committee on Entrance that his previous experience will enable him to utilize this opportunity in a proper way.

SHORT COURSE IN CLAY-WORKING

The two-year or industrial course is designed to assist young men who have already been actively engaged in the Ceramic industries, and who, on account of mature years, or lack of means, or lack of previous educational advantages, are unable to avail themselves of the full and complete course, and yet who wish to increase their earning power or chances of promotion by fitting themselves for other than routine labor. The requirements for admission to this course are very low, and the work required throughout is much less severe than that of the four-year course; in fact, anyone who is willing to really apply himself, can retain his membership in this class, but there is no place for any but those who are thoroughly in earnest, and poor work will not be accepted from those who are able to do good work.

In short, in this industrial course, the department recognizes its closest minimum of communication with the wants of the clay industries, and it is intended to so maintain this course as always to render the greatest good to the greatest number.

NOTE — The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (3) Inorganic.	5.	Chemistry (3) Inorganic.	5.	Chemistry (12) Analytical.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Mathematics (1) Algebra.	5.	Mathematics (3*a*) Geometry.	5.	Shopwork (11) Forging.	3.
				Shopwork (4) Chipping, Filing.	2.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Second Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Ceramics (1) Chem. Analysis.	5.	Ceramics (2) Analysis of Clays.	5.	Ceramics (3) Analysis of Glazes.	5.
Ceramics (4) Raw Materials.	5.	Ceramics (5) Clay Products.	5.	Ceramics (6) Clay Products.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Drawing (11) Mechanical.	5.
		Drawing (1) Freehand.	2.		
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

See also pages 46-50.

SHORT COURSE IN INDUSTRIAL ARTS

This course is primarily designed to extend the benefits of the same kind of training as that given in the four-year course in this subject to that class of young men who may be unable for any reason to undertake a course of four years' duration, but who aspire to become actively engaged in factory work. It has been the aim to give, in as condensed form as possible, those studies which will most rapidly and easily be turned to practical account in manufacturing operations; such as drawing, shopwork, use of machine tools, etc., together with a grounding in the physics, mathematics and mechanisms which underlie these operations.

The course will be found most valuable to young men already engaged in factory work, who find themselves limited from rising in their work on account of lack of technical education.

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.	Drawing (1) Freehand.	1.
Drawing (2) Lettering.	3.	Drawing (3) Projections.	3.	Drawing (4) Drafting.	3.
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Plane Geometry.	5.	Mathematics (13) Space Geometry.	5.	Mathematics (14) Trigonometry.	5.
Shopwork (7) Pattern Making.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (11) Forging.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Second Year

Iudustrial Arts (8) Machine Drawing.	3.	Drawing (3) Descriptive Geom.	3.	Drawing (3) Shades, Shadows.	3.
Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Adv. Machine Work.	3.
Shopwork (3) Foundry.	2.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

See also pages 75-77.

SHORT COURSE IN MINING

The short course in mining is especially designed for young men who have had practical experience in mines, and wish to study mine surveying, drafting, the problems of ventilation, drainage, haulage, mine operating, etc., and also something of the sciences bearing upon their work, but have neither the time nor preparation for a full college course. The first year is devoted to a thorough study of the elementary mathematics and sciences necessary to prepare the student for the practical work of the second year. The experience of the past fourteen years has shown beyond any doubt that any enterprising young miner can master the subject sufficiently well in the time assigned to materially increase his earning capacity and chances for promotion in his occupation.

Personal instruction is given, and it is made thoroughly practical and of such a character as to best adapt it to the needs of the individual student.

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

First Year

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Geometry.	5.	Mathematics (13) Geometry.	5.	Mathematics (14) Trigonometry.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

Second Year

Drawing (2) Lettering.	3.	Drawing (3) Projections.	3.	Drawing (4) Drafting.	3.
Drawing (1) Freehand.	2.	Geology (4) Elementary.	5.	Shopwork (11) Forging.	3.
Chemistry (3) Inorganic.	5.	Chemistry (3) Inorganic.	5.	Metallurgy (9) Mineral Chemistry.	5.
Mine Eng. (1) Mine Surveying.	5.	Mine Eng. (2) Ventilat. Haulage.	5.	Mine Eng. (3) Mine Operating.	5.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

See also pages 91–93.

ARCHITECTURAL DESIGNING

Departments of Instruction

ARCHITECTURE

(DEPARTMENT OF ARCHITECTURE AND DRAWING.)

Professor Bradford, Associate Professor French

The department occupies the entire third floor, one room on the second floor and one room in the basement of Hayes Hall, and is provided with the following equipment for the illustration of the work and for practical training in the same.

For Architecture:—A well lighted designing room, models in plaster and wood illustrating the constructive and ornamental forms of the different styles of architecture, a collection of architectural protographs and lantern slides, architectural drawings and specifications of erected structures, a collection of plates of architectural forms and ornament, samples of material used in constructive work, instruments for experimental work in heating and ventilating, such as anemometers, weather bureau hygrometers, carbonic acid testers and thermometers. The heating apparatus of the several buildings of the University provide valuable material for this work.

The many and varied architectural structures, which are being continually erected in the city of Columbus and which the students can visit and inspect, furnish material of a practical nature, the value of which cannot be over-estimated. A lecture room provided with electric projection lantern enables the presentation of illustrative material for the different classes.

For Freehand Drawing, Water Color and Oil Painting:—A large studio, specially arranged and provided with adjustable tilting tables and easels; a well selected collection of pencil, pen and ink, charcoal and color specimens of work, wooden models of geometric forms, plaster-casts of ornaments, flowers, fruit and the antique.

For Clay-modelling:—A specially arranged and equipped studio for modeling in clay and casting in plaster, consisting of modeling stands, moisture box, casting table, modeling tools of wood and steel, stove and vent-hood for the preparation of gelatine molds, and lockers.

For Mechanical Drawing and Mechanical and Architectural Designing:—A large, well lighted room, provided with O. S. U. drawing tables (30″ by 36″ tops), a set of Schroeder models, a collection of shop drawings and facilities for blue-printing.

For Photography:—A well arranged and equipped dark-room, printing apparatus, copying camera, eight view cameras, lenses of long and short focus, telephotographic lens, color screens, shutters for instantaneous exposures and an excellent outfit for photo-micrography.

In addition to the above, the library contains a well selected collection of books pertaining to the work of the Department.

4. **Specifications.** Lectures and practice in preparing Specifications for Architectural Structures. Two credit hours. (Second term, fourth year, T. 11, W. 1-3. Course in Architecture.)

5. **Decoration and Ornament.** Lectures on the different styles of carved ornament and decorative color. The practice part of this subject will be incorporated in the clay Modeling and Designing. Three credit hours. (First term, third year, M. W. 9; F. 9-11. Course in Architecture.)

6. **Estimates and Superintendence.** Lectures and practice in preparing estimates for structures designed in Courses 8, 11, 12 and 13, and the duties of superintendence. Four credit hours. (Third term, fourth year, M. W. 8; W. 1-5. Course in Architecture.)

7. **Heating, Ventilating and Plumbing.** Lectures and experimental work. Lectures on the principles and methods of heating and ventilating and of sanitary plumbing. Experimental work is carried on with the heating and ventilating plants in the different University buildings. Five credit hours. (Second term, fourth year, M. W. F. 8; M. Tu. 1-3. Course in Architecture.)

8. **Designing.** Lectures and practice. Steel skeleton and fire proof construction. Five credit hours. (Second term, fourth year, Th. 11; Th. F. 1-5. Course in Architecture.)

9. **History of Architecture.** Lectures illustrated by lantern slides. Three credit hours. (First term, second year, M. W. F. 11. Course in Architecture.)

10. Continuation of 9. (Second term, second year, M. W. F. 11. Course in Architecture.)

11. Continuation of 10. (Third term, second year, M. W. F. 11. Course in Architecture.)

12. **Architectural Drawing.** Drawing architectural ornament, details of orders and styles, with the special object of impressing upon the student's mind the architectural characteristics considered in Course 9. Two credit hours. (First term, second year, W. Th. 2-4. Course in Architecture.)

13. Continuation of 12. (Second term, second year, W. Th. 2-4. Course in Architecture.)
14. Continuation of 13. (Third term, second year, W. Th. 2-4. Course in Architecture.)
15. **Designing.** Lectures and practice in designing structures adapted to modern requirements. Four credit hours. (First term, third year, W. Th. 1-4; F. 1-3. Course in Architecture.)
16. **Designing.** Lectures and practice. Two credit hours. (Second term, third year, Th. F. 1-3. Course in Architecture.)
17. **Designing.** Lectures and practice. Four credit hours. (Third term, third year, W. Th. 1-4; F. 1-3. Course in Architecture.)
18. **Designing.** Four credit hours. (First term, fourth year, Th. 10; W. Th. 1-4. Course in Architecture.)
19. **Designing.** Four credit hours. (Third term, fourth year, Th. 11; Th. F. 1-4. Course in Architecture.)
20. **Thesis.** Original design, to be accompanied with written description, specifications and estimate. Five credit hours. (Third term, fourth year, Course in Architecture.)

ASTRONOMY

Office, Emerson McMillin Observatory

Professor H. C. Lord, Mr. Skimming

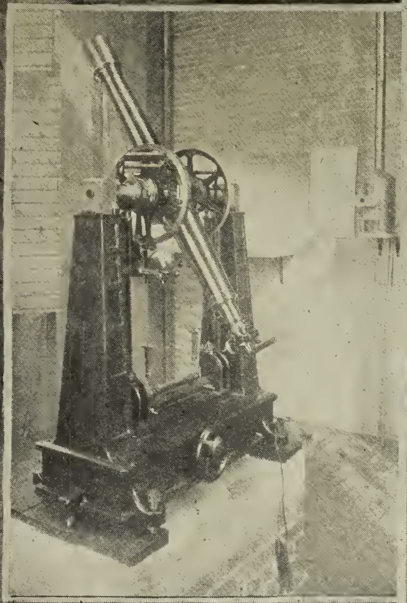
The importance of a practical knowledge of the methods of astronomical observation to Civil Engineers made the establishment of the Emerson McMillin Observatory a very important advantage to the College of Engineering. The instruction given to the Engineering students includes the use of this fine equipment in practical work under the immediate supervision of the Director.

The building and its equipment is the gift of Mr. Emerson McMillin, of Columbus, Ohio, and was built during the summer of 1895. The first floor is divided by a hall and stairway into two parts. The east wing contains an office, library, clock room and a large, well lighted room furnished with tables for the students, where they reduce their observations and keep the records of their work. The west wing contains the transit house, the dome and photographic dark room. The transit house is a light frame structure, so designed as to be kept as free as possible from heat radiated by any heavy wall of masonry. The dome is a wooden framework covered on the outside with canvas.

The equipment consist of a twelve- inch equatorial telescope, mounting by Messrs. Warner & Swasey, objective by Mr. Brashear, with a large and powerful spectroscope by Mr. Brashear. This instrument is adapted to use either one or two prisms or a grating, and is provided with a double set of objectives, one corrected for the visual and one for the photographic rays; a position micrometer with a seven-inch circle by Messrs. Warner & Swasey; a combined zenith telescope and transit instrument of three inches clear aperture by Mr. G. N. Saegmuller; a sidereal clock by Clemens Riefler, of Munich; a comparator by Carl Ziliss; a four-inch portable equatorial by Alvin Clark; a chronograph by Warner & Swasey; sextants, chronometers, meteorological instruments, etc. There is also provided a spectroscopic laboratory, equipped with a Brashear concave grating spectroscope, a two-horse power gas engine and dynamo; a storage battery, and a large induction coil. In addition to the above, Mr. McMillin's gift provides for an excellent astronomical library.

2. **Astronomy, Geodosy and Least Squares.** Lectures on practical Astronomy, supplemented by practice with the instruments of the Emerson McMillin Observatory. Text-book, Doolittle. Three credit hours. (First and second terms, third year, M. W. F. 11; Course in Civil Engineering.)

Four credit hours. (Third term, third year, M. Tu. W. F. 11. Course in Civil Engineering.)



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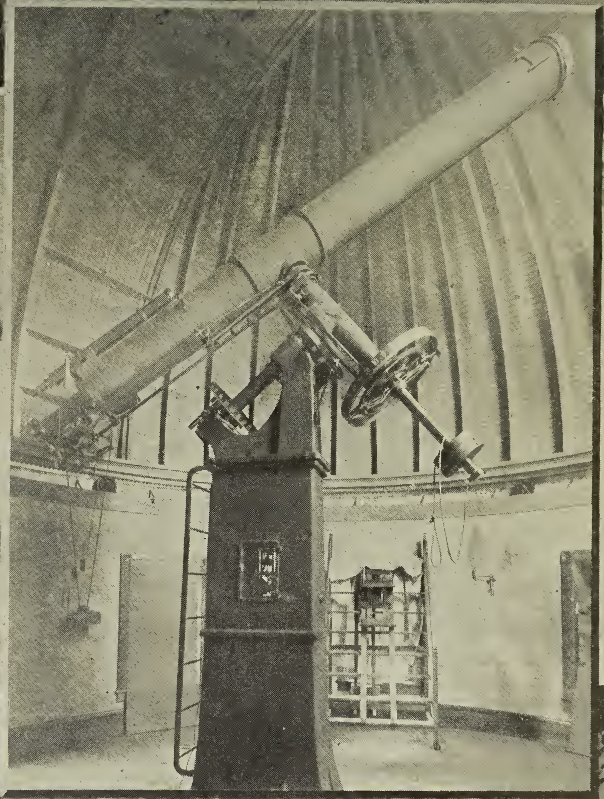

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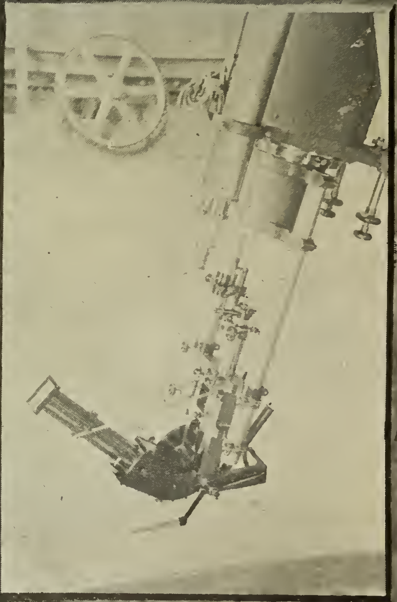


SPECTROSCOPE.

CERAMICS

(DEPARTMENT OF CLAY WORKING AND CERAMICS)

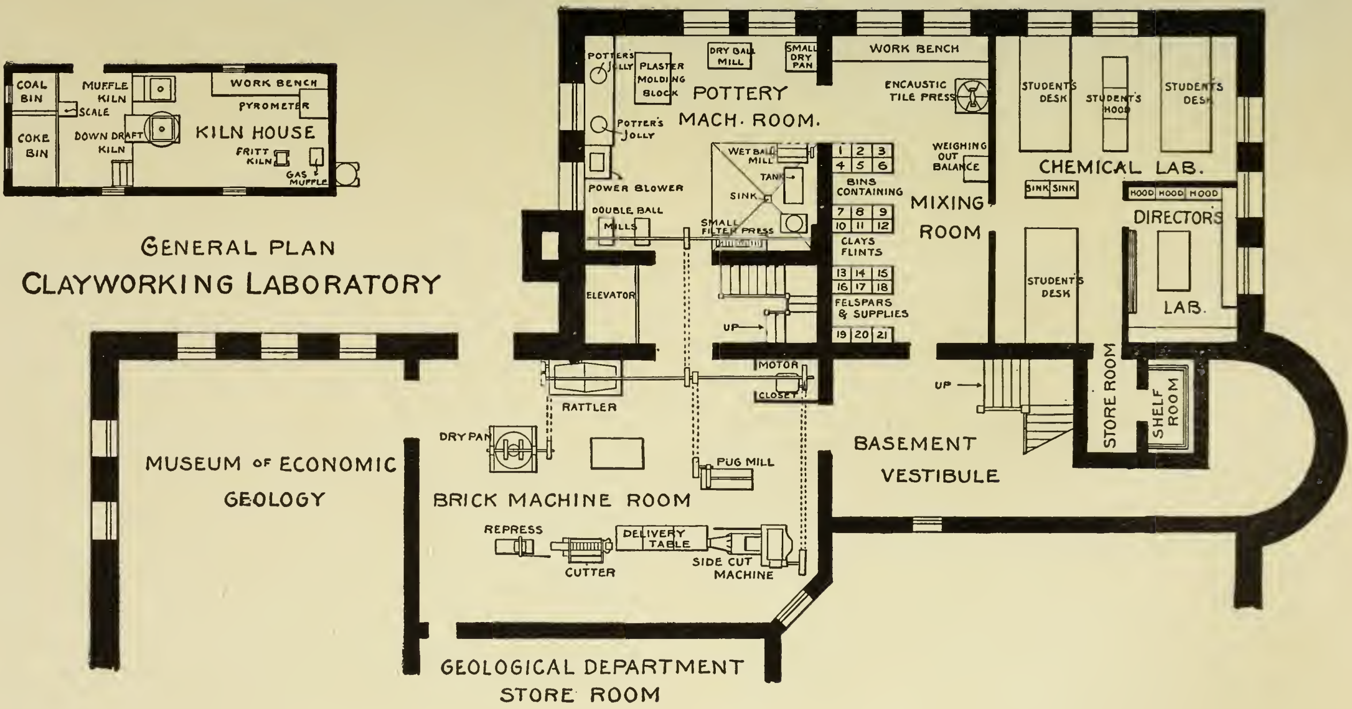
Office, Orton Hall, Room 4

Professor Edward Orton, Jr., Mr. Bleininger

The facilities of the Department for study in the field of clay working comprise: 1st. A convenient chemical laboratory, specially designed and equipped for the analysis and decomposition of silicates. Provision has been made for the use of hydrofluoric acid with safety, and the platinum ware has been made to order with this purpose in view. 2d. A complete mechanical outfit for the preparation of clays for pottery manufacture and the production of the ware itself, of any grade from earthen wares to porcelain. The machinery is of the latest type and comprises all important varieties in use for grinding, tempering, washing, filtering and molding. 3d. A similar plant for the manufacture of brick, tiles, pipes, and hollow goods. The machinery here is of full size and samples up to a ton in weight can be received and transformed into the finished articles by any or all of the standard methods in commercial use. The power for this purpose is derived from a fine electric motor, driven from the University power plant. 4th. A kiln house, equipped with a kiln in which several hundred bricks, or an equivalent quantity of sewer pipe, stoneware, or pottery can be burnt. The fuel is intended to be coke., except in special cases where the fuel available for burning clay wares is to be made the subject of test. There is also provided a crucible melting furnace and a muffle furnace for testing glazes. A muffle kiln of larger size for burning pottery, glazed ware and decorated wares has recently been put into operation. 5th. A ceramic museum, containing a collection of American pottery and clay products of every class, is in process of installation. 6th. A library of the best literature on the subject, mainly German, but containing a few English and French works, and the trade periodicals.

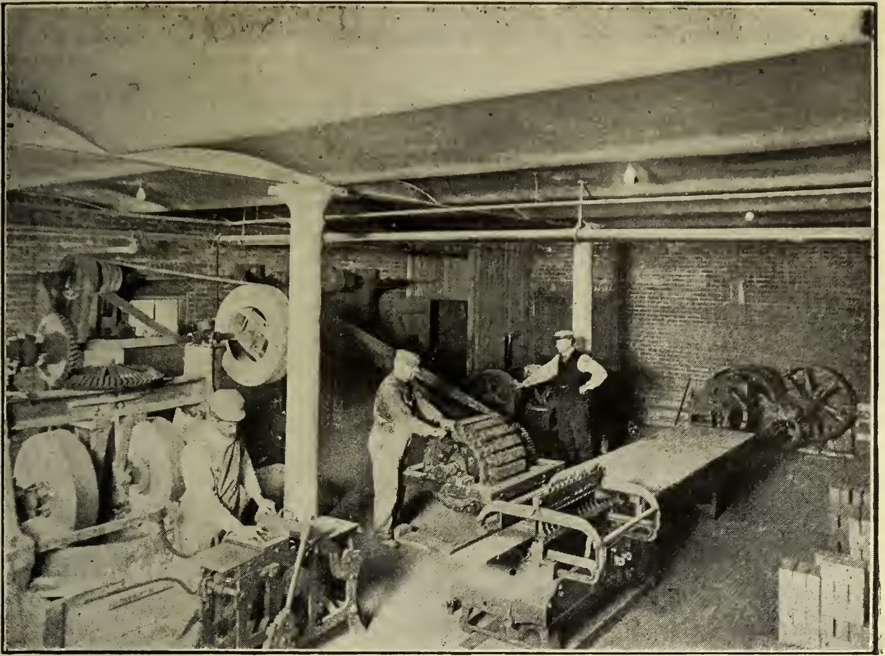
The facilities of the Department for study in the field of cement and mortar materials comprise in addition to the foregoing plant, much of which is especially well suited to this purpose, the following special apparatus. 1st. An improved dry-ball-mill, of chilled iron for grinding the raw material together, and for grinding the cement clinker. 2d. A small cupola, fired with coke and using air blast, for the vitrification of the refractory silicates used. 3d. Access to the complete and well appointed cement testing laboratory of the Department of Civil Engineering.

These facilities permit the Department to offer exceptional opportunities to any who wish to specialize in this important field of manufacture.

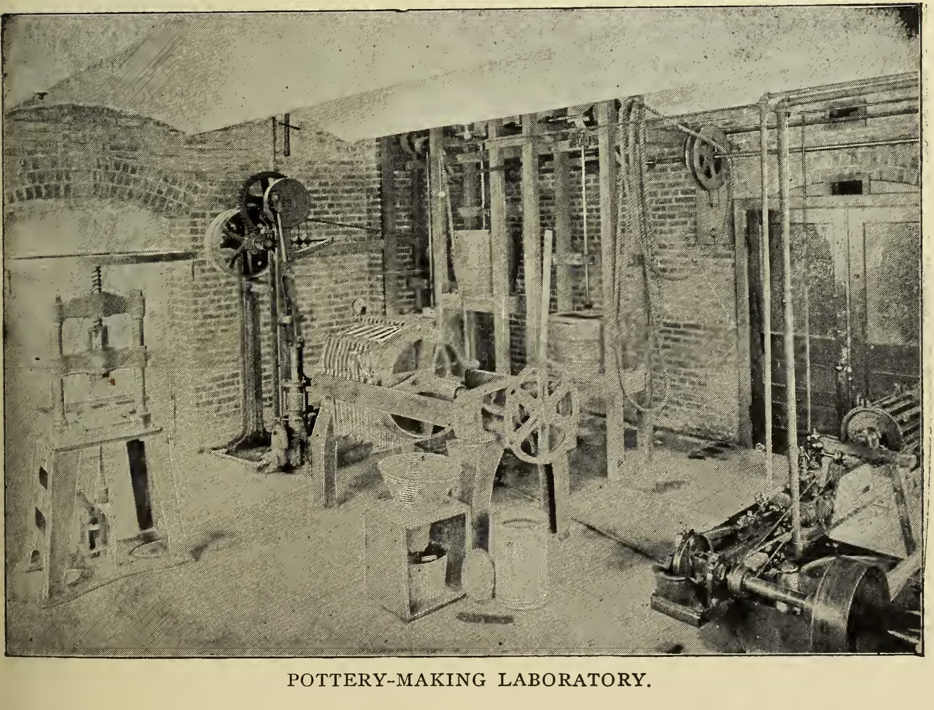


GENERAL PLAN
CLAYWORKING LABORATORY

1. **Ceramic Chemistry.** This course is open only to those who have completed General Chemistry 12. The student begins the quantitative analysis of salts and chemicals, and later works on limestone and other easy minerals. Five credit hours. (First term, second year, M. Tu. W. 1-4. Course in Ceramics and Short Course in Clay-working.)
2. Continuation of Course 1. The student begins the quantitative analysis of clays and complex minerals, working first on samples of known composition, and later on unknown materials. Five credit hours. (Second term, second year, M. Tu. W. 1-4. Course in Ceramics and Short Course in Clay-working.)
3. Continuation of Course 2. The student completes the ultimate analysis of clays and begins the proximate or "Rational" analysis of clays and pottery bodies, following the methods of Seger. Five credit hours. (Third term, second year, M. Tu. W. 1-4. Course in Ceramics and Short Course in Clay-working.)
4. **Lectures on Clay Manufacture** (supplemented by frequent recitations). The origin, composition and properties of clays and other minerals employed in the clay, glass and cement industries. Five credit hours. M. Tu. W. Th. F. 8. (First term, third year, Course in Ceramics; second year, Short Course in Clay-working.)
5. Continuation of Course 4. A series of lectures, with recitations, on the general principles of the manufacture of clay wares, including the selection and winning of the materials, their preparation and manufacture. Five credit hours. M. Tu. W. Th. F. 8. (Second term, third year, Course in Ceramics; second year, Short Course in Clay-working.)
6. Continuation of Course 5. A series of lectures, with recitations, on the drying, burning, and decoration of claywares, including the preparation of coloring materials, glazes, etc. Five credit hours. M. Tu. W. Th. F. 8. (Third term, third year, Course in Ceramics; second year, Short Course in Clay-working.)
7. **Ceramic Chemistry.** Continuation of Course 3. Open only to those who have completed that course. The analysis of glasses and glazes, devoting special attention to the use of hydrofluoric acid in silicate analysis, and to the determination of lead and boracic acid. Five credit hours. (Second term, third year, M. Tu. W. 1-4. Course in Ceramics.)



BRICK-MAKING LABORATORY.



POTTERY-MAKING LABORATORY.

9. **Laboratory Work in Ceramics.** Open only to those who have completed Courses 3 and 6. The student will first practice the various methods of measurement of the physical properties of clays. and then will undertake the production of such wares as are made from single clays; then wares made by blending two or more natural clays; and, then, such wares as are made from an artificial body. In each case the bodies made will be burnt and tested. Five credit hours. (First term, fourth year, W. Th. F. 1-4. Course in Ceramics.)

10. Continuation of Course 9. The student will practice on the production of glasses and glazes, beginning with the natural "slip glazes" and taking successively the soft raw-lead glazes, the fritted lead-boracic-acid glazes, and the hard-fire leadless porcelain glazes. In each case the glazes will be made for use on some definite body, and will be made to "fit." Five hours credit. (Second term, fourth year, W. Th. F. 1-4. Course in Ceramics.)

11. Continuation of Course 10. The student will practice on the use of the coloring and opacifying oxides in glazes, and on the production of colors for the decoration of pottery, and of body-stains. Five credit hours. (Third term, fourth year, M. F. 8-12; F. 1-3. Course in Ceramics.)

12. **Lectures on Cement Manufacture.** The theory of hydraulicity, the compounding, manufacture and testing of natural and Portland cements and hydraulic silicates. Open to students who have had courses 3 and 6. Facilities for laboratory work in making, burning and testing cements will be given. Five credit hours. (Second term, fourth year, M. Tu. W. Th. F. 11. Course in Ceramics.)

15. **Thesis.** See requirements for graduation, page 114.

16. **General Principles of Applied Ceramics.** A series of lectures on the chemical technology of the clay, glass and cement industries. Five credit hours. (Third term, fourth year, M. Tu. W. Th. F. 11. Course in Chemical Engineering.)

17. **Practice** in making drawings and specifications for brick kilns, brick dryers, pottery kilns, gas producers, glass pot-furnaces, glass tanks, cement kilns and burning cylinders. Students will be allowed to specialize along the lines they intend to follow. Four credit hours. (Second term, fourth year, M. Tu. 1-5. Course in Ceramics.)

CHEMISTRY

Office, Chemical Hall, Room 20

Professor McPherson, Emeritus Professor Norton, Associate Professor Henderson, Associate Professor Foulk, Mr. ———, Mr. ———, Mr. ———

The Department of Chemistry occupies the larger portion of the Chemical Hall. The main lecture room is situated on the second floor and has a seating capacity of one hundred and seventy-five persons. There are four main laboratories; one for students in elementary chemistry and qualitative analysis, accommodating two hundred and fifty; one for quantitative analysis with desks for fifty; one for advanced qualitative and sanitary analysis and one for organic chemistry, each with accommodations for twenty. In addition to these, there is an office, a balance room, three private laboratories and several smaller rooms, used for combustion work, spectroscopic work and private investigations.

The laboratories are equipped with all the modern conveniences, as water, gas, steam ovens, drying ovens, automatic air blasts, electric lights, etc. Distilled water is piped from the large still in the attic to each room.

Each student has his own desk with drawers and locker. All supplies are obtained from the chemical store room which is liberally supplied with all the apparatus and material necessary for chemical investigation.

The Department is also well equipped with all apparatus necessary for experimentally illustrating the class room work. The main lecture room is furnished with cases which contain a large collection of specimens for purposes of illustration.

3. **Elementary Chemistry.** One hour lecture, one hour quiz and six hours laboratory work weekly. Five credit hours. (First term, M, 8; Tu. W. 1-4; Th. 10. Second term, M. 3; Tu. W. 1-4; Th. 10; first year, Course in Clayworking; second year, Short Course in Mining.)

7. **Elementary Chemistry.** Inorganic. Lectures, laboratory and quiz. Laboratory work: first term, experiments upon the non-metals; second term, experiments upon the metals. Five credit hours. (First and second terms. Lecture, M. 8 or 3; quiz, F. 10, 11, 3 or 4; laboratory, M. Tu. 9-12; Th. F. 9-12; Th. F. 1-4; or W. 8-10, S. 8-12. All four-year courses.)

8. **Organic Chemistry.** Lectures and laboratory. Five credit hours. (First term, third year, M. 1-5; S. 8-12, Course in Chemical Engineering.)

9. **Organic Chemistry.** Lectures and laboratory. Five credit hours. (Second term, third year, F. 1-5; S. 8-12. Course in Chemical Engineering.)

12. **Qualitative Analysis.** Four credit hours. (Third term, all four-year courses. For hours, see Course 7, omitting lecture.)
Five credit hours. (Third term, first year, W. 8-10; F. 1-4; S. 8-11; Th. 10. Course in Clayworking.)

15. **Sanitary Chemistry.** Lectures and laboratory. A study of the most important chemical methods for the analysis of water and air. Four credit hours. (Third term, fourth year, Tu. Th. 10; F. 1-5. Course in Chemical Engineering.)

17. **Inorganic Preparations.** Four credit hours. (Third term. Elective.)

20. **Quantitative Analysis.** Laboratory, lectures and recitations. This course is designed to give the student a knowledge of the first principles of gravimetric and volumetric analysis. Four credit hours. The course should be accompanied by courses 21 and 31. (First, second and third terms, second year, M. Tu. 1-4; W. 1-3. Course in Chemical Engineering. Option third year, Course in Manual Training.)

21. **Advanced General Chemistry.** Lectures and recitations. This course consists of a rapid review of the fundamental physical and chemical laws relating to chemistry, followed by a thorough study of the principles of general inorganic chemistry. Two credit hours. (First, second and third terms, second year, Tu. Th. 9. Course in Chemical Engineering. Option third year. Course in Manual Training.)

30. **Physical Chemistry.** Lectures and recitations. This course is arranged to cover the ground outlined in Walker's text book of Physical Chemistry. Three credit hours. (Second and third terms, fourth year, M. W. F. 8. Course in Chemical Engineering.)

31. **Stoichiometry.** Recitations. Drill in solution of chemical problems. Two credit hours. (First term, second year, Tu. Th. 11. Course in Chemical Engineering.)

32. **Industrial Chemistry.** Laboratory and lectures. Four credit hours. (First term, Tu. F. 10; F. 1-3. Second term, Tu. Th. 10; F. 1-3. Fourth year. Course in Chemical Engineering.)

CHEMICAL LECTURE ROOM.

CIVIL ENGINEERING

Office, Hayes Hall, Room 13

**Professor Brown, Professor Sherman, Professor Heller, Associate Professor Eno, Mr. Davies*

The Department occupies the east and west wings of the second floor and two basement rooms in Hayes Hall. The large and well lighted room of the east wing, 38′ x 47′, is equipped with 50 drawing tables and is used for the department drawing classes. A large case of drawers filled with shop drawings, working drawings and maps, gathered from practicing engineers, is open to students for study and consultation. These drawings lay before them good examples of engineering practice. A considerable outfit of office drawing instruments is provided for those students requiring them in special work. This includes long steel straight edges, large triangles, parallel rulers, protractors, section liners, planimeter, pantograph, etc.

In the west wing are the instrument and blue print rooms, and the recitation room, equipped with electric lantern. The instruments for instruction in surveying include one high grade transit, seven other transits fitted for various kinds of surveying, four leveling instruments, solar compass, solar attachments for two transits, two high grade aneroid barometers, rods, chains, tape lines, hand levels, two current meters for measuring flow of water in streams. There is also a complete camp outfit for the summer field work in surveying.

The blue print room has three large frames and abundant facilities for preparing paper and washing prints.

There is a collection of models for illustration of bridge and roof trusses and of problems in stereotomy. Numerous photographs of bridges and other engineering structures are included.

The basement rooms are equipped for cement testing with two testing machines, a Boehme hammer, briquette molds, sieves, hot test apparatus, etc.

The Department has, for rating current meters, an excellent course 175 feet long in one side of the reservoir belonging to the University Power Plant.

1. **Land Surveying.** Recitations and field work. Johnson's Theory and Practice of Surveying. Six credit hours. (First term, second year, M. Tu. W. Th. F. 1, M. 2-4; or M. Tu. W. Th. F. 11, Tu. 2-4; or M. Tu. W. Th. F. 1, W. 2-4. Course in Civil Engineering.)
2. **Railroad Surveying.** Recitations and field work. Searle's Field Engineering and Crandall's Transition Curve. Six credit hours. (Third term, second year, M. Tu. W. Th. F. 1, M. 2-4; or M. Tu. W. Th. F. 11, Tu. 2-4; or M. Tu. W. Th. F. 1, W. 2-4. Course in Civil Engineering.)

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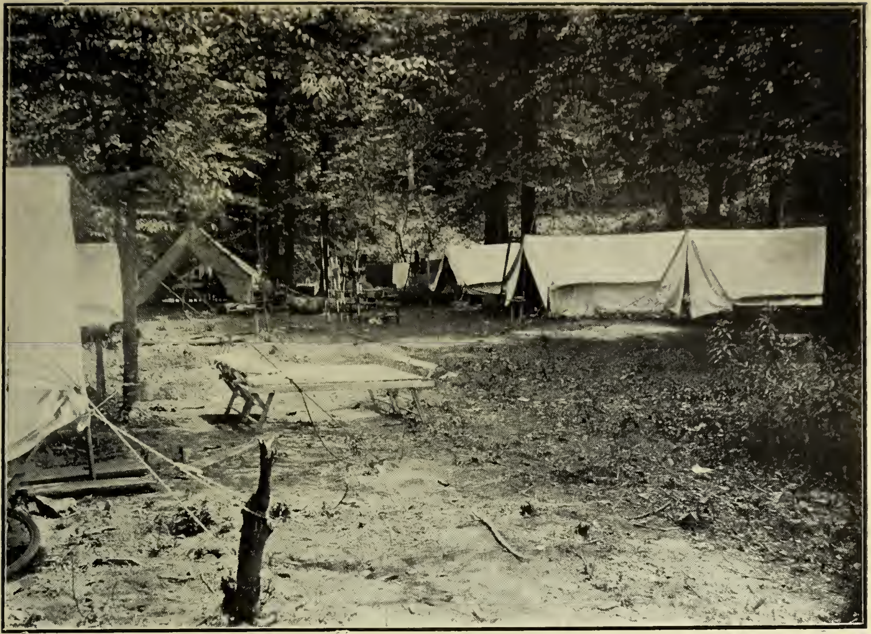
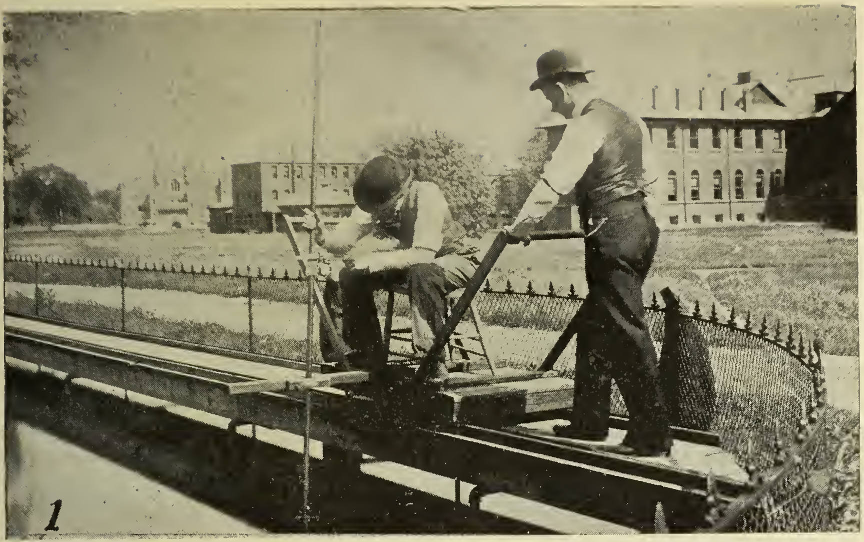
* Died March 6, 1902.



SUMMER CAMP.

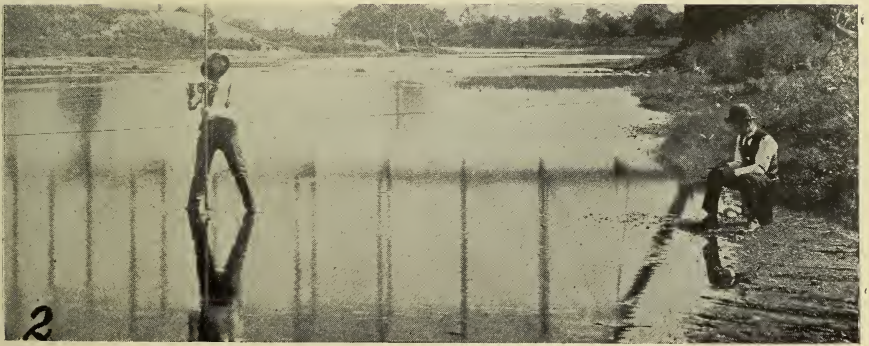
CLASS IN SURVEYING

3. **Topographical Surveying.** Lectures, field work and drawing. Johnson's Surveying used for reference. Four times a week. (First term, third year, M. Th. 10, S. 8-12; or Tu. F. 10, S. 8-12. Course in Civil Engineering.)
4. **Topographic Drawing.** Platting, pen and tinted work. Reed's Topographical Drawing and Sketching. Four credit hours. (Second term, second year, M. Tu. 1-4, W. 1-3; or Th. F. 2-4, S. 8-12. Course in Civil Engineering.)
6. **Stereotomy.** Recitations, drawing and model cutting. Warren's Stereotomy. Four credit hours. (Second term, third year, M. Th. 10, S. 8-12; or Tu. F. 10, S. 8-12. Courses in Architecture and Civil Enginering.)
7. **Bridge Stresses.** Recitations and lectures. Part I of Dubois's Stresses in Framed Structures. Five credit hours. (Third term, third year, M. Tu. W. Th. F. 8 or 9. Course in Civil Engineering.)
8. **Bridge Designing.** Lectures and drawing. Part II of Dubois's Stresses in Framed Structures and Johnson's Modern Framed Structures used for reference. Five credit hours. (First term, fourth year, M. Tu. W. Th. F. 2-4. Course in Civil Engineering.)
10. **Sanitary Engineering.** .Recitations and lectures. Folwell's Sewerage. Five credit hours. (Third term, fourth year, M. Tu. W. Th. F. 11. Course in Civil Engineering.)
14. **Civil Engineering Laboratory.** Cement testing.. Two credit hours. (Second term, fourth year, M 1-5; or Tu. 1-5. Course in Civil Engineering.)
15. **Masonry Construction.** Recitations and lectures. Baker's Masonry Construction. Five credit hours. (First term, fourth year, M. Tu. W. Th. F. 9 Courses in Architecture and Civil Engineering.)
16. **Highways.** Recitations and lectures. Byrne's Highway Construction. Five credit hours. (First term, third year, M. Tu. W. Th. F. 8 or 9. Course in Civil Engineering.)
17. **Railway Location.** Recitations and lectures. Wellington's Economic Theory of Railway Location. Five credit hours. (Second term, fourth year, M. Tu. W. Th. F. 8. Course in Civil Engineering.)
18. **Water Supply.** Recitations and lectures. Folwell's Water-Supply Engineering. Five times a week. (Third term, fourth year, M. Tu. W. Th. F. 1. Course in Civil Engineering.)
19. **Trusses.** Lectures and drawing. Five credit hours. (Third term, third year, M. Tu. W. Th. F. 9 or 11. Courses in Architecture, Mining and Mechanical Engineering.)
21. **Surveying.** Recitations and field work. Bruce and Ketchum's Manual. Three credit hours. (Third term, fourth year, M. W. F. 9. Courses in Architecture and Industrial Arts.)



1

MEASURING VELOCITY OF CURRENTS



2

MAKING CROSS SECTION OF RIVER BED

22. **Summer Course in Field Work.** The students are taken into camp in a rough, broken country and given a thorough drill in land and elementary railroad surveying. The course begins directly after Commencement Day, and continues four weeks of six days per week, ten hours per day. The work of the student and the discipline of the camp is in the hands of competent instructors. This course must be preceded by Courses 1, 2 and 4. Students conditioned on any of these courses may be admitted at discretion of instructor in charge. (At conclusion of second year of course.)
23. **Summer Course in Field Work.** Similar to Course 22. Students work on advanced railroad surveying and topographical surveying. This course must be preceded by Courses 3, 22 and 24. Students conditioned in any of these courses may be admitted at discretion of instructor. (At conclusion of third year of course.)
24. **Drawing of Engineering Structures.** Five credit hours. (Second term, third year, M. Tu. 1-5, W. 1-3; or W. 3-5, Th. F. 1-5. Course in Civil Engineering.)
25. **Advanced Bridge Work.** Draw-spans, continuous girders, steel arches, etc. Five credit hours. (Second term, fourth year, M. Tu. W. Th. F. 8. Option, Course in Civil Engineering.)

AT WORK IN THE FIELD

DRAWING

(DEPARTMENT OF ARCHITECTURE AND DRAWING.)

Office, Hayes Hall, Room 23

Professor Bradford, Associate Professor French, Mr. Lewis, Mr. Martin, Mr. Vosskuehler

1. **Free Hand Drawing.** Pencil, charcoal, pen and water-color drawing from copies, models and plaster casts. Practice and occasional lectures.

   One credit hour. W. 1-3 or S. 8-10. (First, second and third terms, first year, Short Course in Industrial Arts.)

   Two credit hours . (First term, second year, W. F. 8-10, Short Course in Mining; second term, second year, Th. F. 1-3. Short Course in Clayworking.)

   Two credit hours. M. W. 8-10; M. Tu. 10-12; M. Tu. 1-3; M. F. 1-3; Th. F. 10-12; Th. F. 1-3; W. F. 8-10; W. 1-3; S. 8-10; or Tu. Th. 1-3. (First and second terms, first year of all four-year courses.)

2. **Lettering.** Practice and occasional lectures.

   Three credit hours. Th. F. 1-4. (First term, first year, Short Course in Industrial Arts; second year, Short Course in Mining.) W. F. S. 8-10; W. F. 8-10, S. 10-12; M. 8-10, S. 8-12; M. W. 8-10, S. 10-12; M. Tu. 1-4; or W. F. 1-4. (Third term, first year, all four-year courses.)

   This course must be preceded or accompanied by Course 1.

3. **Projections.** Orthographic, isometric and oblique projections, and elementary working drawing. Three credit hours. Must be preceded by Course 2. (First term, second year.)

LECTURES.	PRACTICE.	COURSES IN
M. 8	Tu. Th. 9–11	Architecture.
W. 11	M. F. 10–12	Ceramics.
W. 11	M. F. 10–12	Chemical Engineering.
M. 8	Tu. Th. 9–11	Civil Engineering.
Th. 11	M. F. 10–12	Electrical Engineering.
W. 11	M. F. 10–12	Industrial Arts.
W. 11	M. F. 10–12	Manual Training.
W. 11	M. F. 10–12	Mech. Engineering.
Tu. 11	Tu. Th. 9–11	Mining Engineering.

(Second term, first year, Th. F. 1-4. Short Course in Industrial Arts; second year, Short Course in Mining.)

MECHANICAL DRAWING ROOM

FREE HAND DRAWING ROOM

3. **Descriptive Geometry.** Three credit hours. (Second term, second year.)

LECTURES.	PRACTICE.	COURSE IN
M. W 11	F. 10–12	Ceramics.
Tu. Th. 11	F. 10–12	Chemical Engineering.
Tu. Th. 11	F. 10–12	Elevtrical Engineering.
M. W. 11	F. 10–12	Industrial Arts.
Tu. Th. 11	F. 10–12	Manual Training.
M. W. 11	F. 10–12	Mech. Engineering.
Tu. Th. 11	Tu 9-11; or F. 10-12.	Mining Engineering.
Tu. Th. 8	Th. 9–11	Short Industrial Arts.

3. **Descriptive Geometry.** Five credit hours. (Second term, second year, M. W. 8, Tu. Th. 8-11. Courses in Architecture and Civil Engineering.)

3. **Shades, Shadows and Perspective.** Five credit hours. (Third term, second year, M. W. 8, Tu. Th. 8-11. Course in Architecture.) Three credit hours. (Third term, second year.)

LECTURES.	PRACTICE.	COURSE IN
W. 11	M. F. 10–12	Ceramics.
Tu. 8	Tu. Th. 9–11	Civil Engineering.
Th. 11	M. F. 10–12	Electrical Engineering.
W. 11	M. F. 10–12	Industrial Arts.
W. 11	M. F. 10–12	Manual Training.
W. 11	M. F. 10–12	Mech. Engineering.
Tu. 11	Tu. Th. 9–11	Mining Engineering.
Tu. 8	Tu. Th. 9–11	Short Industrial Arts.

4. **Draughting and Blue-printing.** Practice and occasional lectures. Three credit hours. Th. F. 1-4. (Third term, first year, Short Course in Industrial Arts; and second year, Short Course in Mining.) This course must be preceded by the first term of Course 3.

5. **Technical Drawing.** Rules and methods for making working drawings in machine design, to represent correctly form and dimensions for shop use, and for tracing and blue-printing the same. Three credit hours. (First term, third year, Th. F. 1-4. Courses in Electrical and Mechanical Engineering, Industrial Arts and Manual Training.) This course must be preceded by Course 3.

7. **Photography.** Lectures: Optics of photography, chemistry of photography, exposing and developing, printing, lantern slides, orthochromatic photography and some of the applications of photography. Practice: outdoor, interior, instantaneous and flashlight photography, copying, lantern slides and printing. Two credit hours. (First term, third year, M. T. 1-3. Course in Architecture; M. Tu.

MODELING ROOM

PHOTOGRAPHIC LABORATORY

1-3; or Th. F. 1-3, third term, third year, Courses in Civil and Mechanical Engineerin; fourth year. Courses in Ceramics and Mining Engineering.)

11. **Mechanical Drawing.** Lectures and practice. Five credit hours. (Third term, second year, W. 9, Th. F. 1-4. Course in Clay-Working.)

12. **Clay Modeling.** Modeling in clay and casting in plaster ornamental forms from designs, photographs, nature and original designs. Two credit hours. (Second and third terms, third year, M. Tu. 1-3. Course in Architecture.)

This course must be preceded by Course 1.

14. **Pen Drawing.** Two credit hours. (First term, second year, M. Tu. 2-4. Course in Architecture.)

This course must be preceded by Course 1.

18. **Water Color Painting.** Three credit hours. (Second term, fourth year, Tu. Th. 8-11. Course in Architecture.)

19. **Water Color Painting.** Two credit hours. (Third term, fourth year, Tu. Th. 8-10. Course in Architecture.)

21. **Technical Drawing.** Two credit hours. (First term, third year, Tu. Th. 8-10. Course in Chemical Engineering.) Must be preceded by Course 3.

22. **Technical Drawing.** Two credit hours. (Second term, third year, W. Th. 1-3. Course in Chemical Engineering.)

23. **Technical Drawing.** Two credit hours. (Third term, third year, M. Tu. 1-3. Course in Chemical Engineering.)

ECONOMICS AND SOCIOLOGY

Office, University Hall, Room 18

Professor Clark, Assistant Professor Hagerty

Course 1 should precede all other courses except 2, 3 and 4.

1. **Elements of Political Economy.** Text-book, lectures and individual investigations. A careful study of the laws of production, exchange, distribution and consumption of wealth; combined with an analysis of the industrial actions of men as regards land, labor, capital, money, credit, rent, interest, wages, etc. Three credit hours. Three terms, third year, M. W. F. 8. Course in Industrial Arts.)

2. **Industrial Society.** Three credit hours. (First term, second year, M. W. F. 9. Course in Industrial Arts.)

3. **Indnstrial and Financial History.** Three credit hours. (Second term, second year, M. W. F. 9. Course in Industrial Arts.)

4 **Transportation Problems**. Lecture. A study of the development and present economic status of roads, canals and railroads in their relation to industry and to the state. Three credit hours. (Third term, second year, M. W. F. 9. Course in Industrial Arts.)

5. **Immigration and Money.** Two credit hours. (First term, fourth year, Tu. Th. 9. Course in Industrial Arts.)

6. **Railroads, Crisis, Tariff.** Two credit hours. (Second term, fourth year, Tu. Th. 9. Course in Industrial Arts.)

7. **Labor and Capital.** Two credit hours. (Third term, fourth year, Tu. Th. 9. Course in Industrial Arts.)

EDUCATION

Office, University Hall, Room 54

Associate Professor Major, Dr. Haines

1. **Educational Psychology.** The aim of this course is to make a thorough study of laws and principles selected from psychological literature which seem to bear upon educational theory and practice. Emphasis is laid upon the function of psychology in determining the selection and arrangement of school studies, as well as upon its bearing on class room procedure.

The work of the first and second terms is based on James' *Talks on Psychology* supplemented by references to standard texts and to periodicals devoted to psychology and education. The work of the third term will consist of a study of normal mental types, a description of the so-called stages of mental development, and a study of special topics in mental pathology.

Three credit hours per term. (Second year, M. W. F. 8. Course in Manual Training.)

5. **Science of Education.** The aim of the course is to afford a wide view of the foundations of educational theory, endeavoring to develope a theory in outline. It is especially intended for the student who expects to deal with the larger problems of education, which confront superintendent or principal. It means to widen his horizon and at the same time to orientate him in this larger world. But this enlarged view and intelligent grasp of the fundamental problems of education, all teachers should have, to make them masters of their art. It should help all specialists to see the place of their particular grade or subject in the developmental process of the individual pupil. The work will be by lectures, required readings and reports. Three credit hours per term. (Fourth year, M. W. F. 11. Course in Manual Training.)

ELECTRICAL ENGINEERING

Office, Electrical Building, Room 8

Professor Caldwell, Assistant Professor Fish, Mr. Brooks

This Department has excellent facilities for practical experimental work with dynamo machinery and other electrical apparatus. The elementary electrical testing is provided for in the Physical Department, which permits this Department to devote its time to engineering apparatus proper. The dynamo equipment consists of twenty machines of various makes and sizes from 40-H. P. down, aggregating over 230 horsepower. These include 110 and 500 volt direct and alternating current generators, polyphase motors, arc and incandescent lighting generators, railway and stationary motors, three rotary converters specially designed for experimental work, and a unipolar dynamo. The latter, with an alternating current generator, a 2-phase motor and one of the rotary converters were built by the students, it being the policy of the Department to build much of its apparatus. There are also a number of transformers of different makes, including one for welding, one for very high voltage and one of special design for testing. Arc lamps of different styles, a 10 kilowatt-hour storage battery, condensers, resistances, circuit breakers, and magnetic testing apparatus also form part of the equipment. The measuring instruments include a standard Weston voltmeter with standard resistances and cells and thirteen other Weston volt and ammeters, also four Kelvin static voltmeters, five dynamometers, two wattmeters, galvanometers and seventeen other ammeters and voltmeters of different makes. There is a telephone laboratory with apparatus for comparative tests, a variety of transmitters and receivers, lines running to another building, and material illustrative of switch-board practice. Photometry is given at present in the Physical Laboratory, where the equipment in this line is excellent.

Power for running the dynamo laboratory is supplied by three induction motors from the University Power Plant. There is also a well selected and growing collection of photographs, blue-prints, and material illustrative of electrical manufacture. The library of the Department is on the second floor and is especially valuable on account of the completeness of its sets of periodicals and transactions.

The University Power Plant (see page 104) is of great value as illustrative of a model installation. This plant has been largely installed by students who receive pay for such work.

There is a machine shop and a machinist who gives half his time to construction and repair work.

Columbus and neighboring towns have many electric plants of different systems which welcome visiting students. It is also usual to make an inspection trip to one or more of the cities of the State to visit manufacturing establishments and other points of electrical interest.

The Electrical Hall was built in 1889 by a special appropriation of the Legislature, and is occupied entirely by the Department of Electrical Engineering. It is a two-story brick building about seventy-five by forty-five feet. In the first floor sixty feet are taken up by the dynamo room, the full width of the building. The remainder of the floor is occupied with an office and apparatus room, a shop, a dark room for photography and a calibrating room arranged for the accurate and easy standardization of the instruments used in the laboratory. On the second floor are a lecture and draughting room 45 by 30 feet, a reading room and library, office, photometric, magnetic and telephone laboratories, locker room and janitor's room. The building and its equipments are valued at about nineteen thousand dollars.

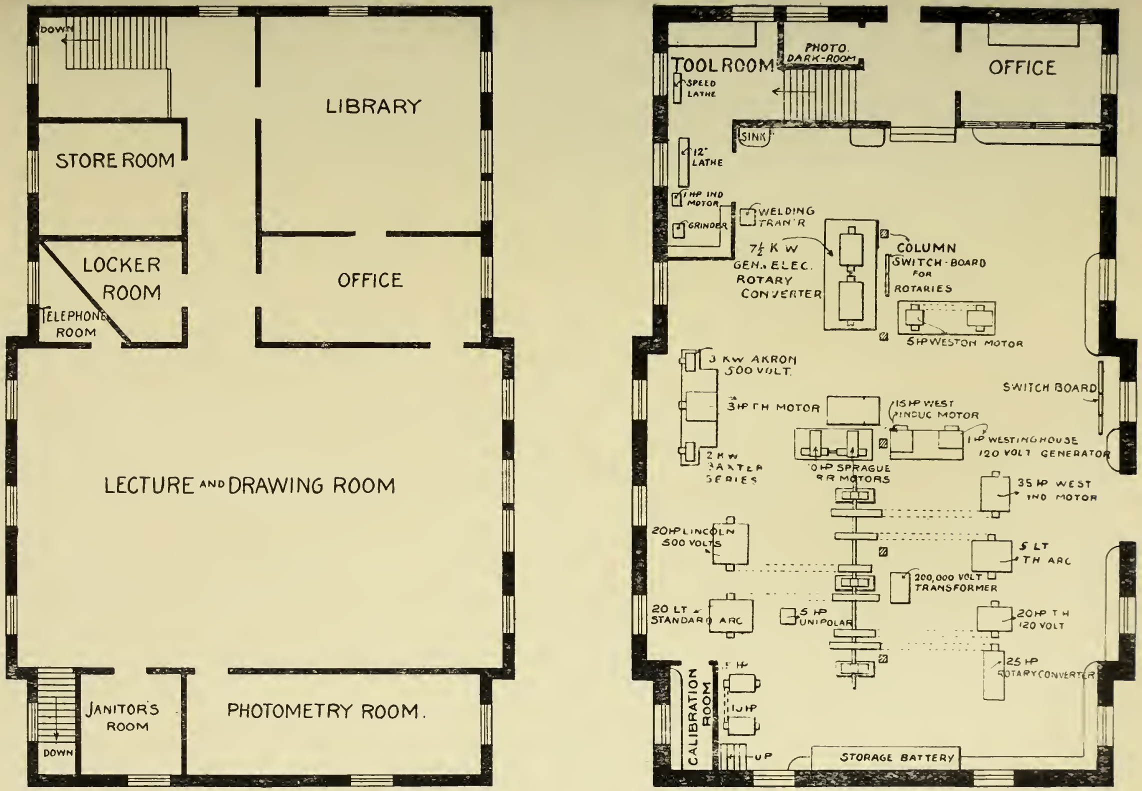
6. **Electrical Engineering.** Lectures on direct and alternating circuits, dynamo machinery, transformers, accumulators and their applications. Two credit hours, M. Th. 10. (First and second terms, third year, Course in Architecture; fourth year, Courses in Civil, Mechanical and Mining Engineering, Industrial Arts and Manual Training. First term, fourth year. Course in Chemical Engineering.

7. **Electrical Engineering.** Laboratory work on the subjects treated in Course 6, which it accompanies. Two credit hours, fourth year.
First Term — Th. 1-5. Course in Chemical Engineering.
W. 1-5. Course in Industrial Arts.
W. 1-5. Course in Manual Training.
Tu. or W. 1-5. Course in Mechanical Engineering.
M. 1-5. Course in Mining Engineering.
Second Term — W. 1-5. Course in Architecture.
M. or T. 1-5. Course in Civil Engineering.
Th. 1-5. Course in Industrial Arts.
Th. 1-5. Course in Manual Training.
Th. 1-5 or
S. 8-12. Course in Mechanical Engineering.
W. 1-5. Course in Mining Engineering.

8. **Direct Current Dynamo Machinery.** Generators and motors, their theory, construction and operation. Lectures, recitations and problems. Four credit hours. (Second term, third year, M. Tu. Th. F. 9. Course in Electrical Engineering.)

9. **Elementary Dynamo Laboratory.** Handling and testing of circuits, generators, motors, etc. Four credit hours. (Third term, third year, W. Th. 1-5; or F. 1-5, S. 8-12. Course in Electrical Engineering.)

10. **Alternating Current Circuits and Machinery.** Generators, transformers, single and polyphase motors, apparatus and systems. Lectures, recitations and problems. Three credit hours. (First term, M. W. F. 11; second term, M. W. F. 8, fourth year. Course in Electrical Engineering.)



SECOND FLOOR PLAN

FIRST FLOOR PLAN

ELECTRICAL LABORATORY.

11. **Advanced Dynamo Laboratory.** Continuation of the work begun in Course 9, together with alternate current apparatus, telephone apparatus, accumulators, lamps, etc. Three credit hours. (First term, F. 1-5, S. 8-11; second term, F. 9-12, 1-4; third term, M. T. 1-4; fourth year. Course in Electrical Engineering.)

12. **Electrical Transmission and Distribution.** Systems, operation and apparatus. Two credit hours. (Second term, fourth year, Tu. Th. 8. Course in Electrical Engineering.)

13. **Application of Electricity.** Brief treatment of the elements of lumination, street railway work, telephone, telegraph, electro-metallurgy, mining, etc. The seminary method is used in this course to the extent of each student writing one paper on some assigned subject, and reading the same before the class. Five credit hours. (Third term, fourth year, M. Tu. W. Th. F. 8. Course in Electrical Engineering.)

14. **Electrical Design.** Includes wiring of buildings, direct and alternate current generators, transformers, distribution, etc. Four credit hours. (Second term, M. T. 1-4; third term, Th. F. 1-4; fourth year, Course in Electrical Engineering.)

FRENCH

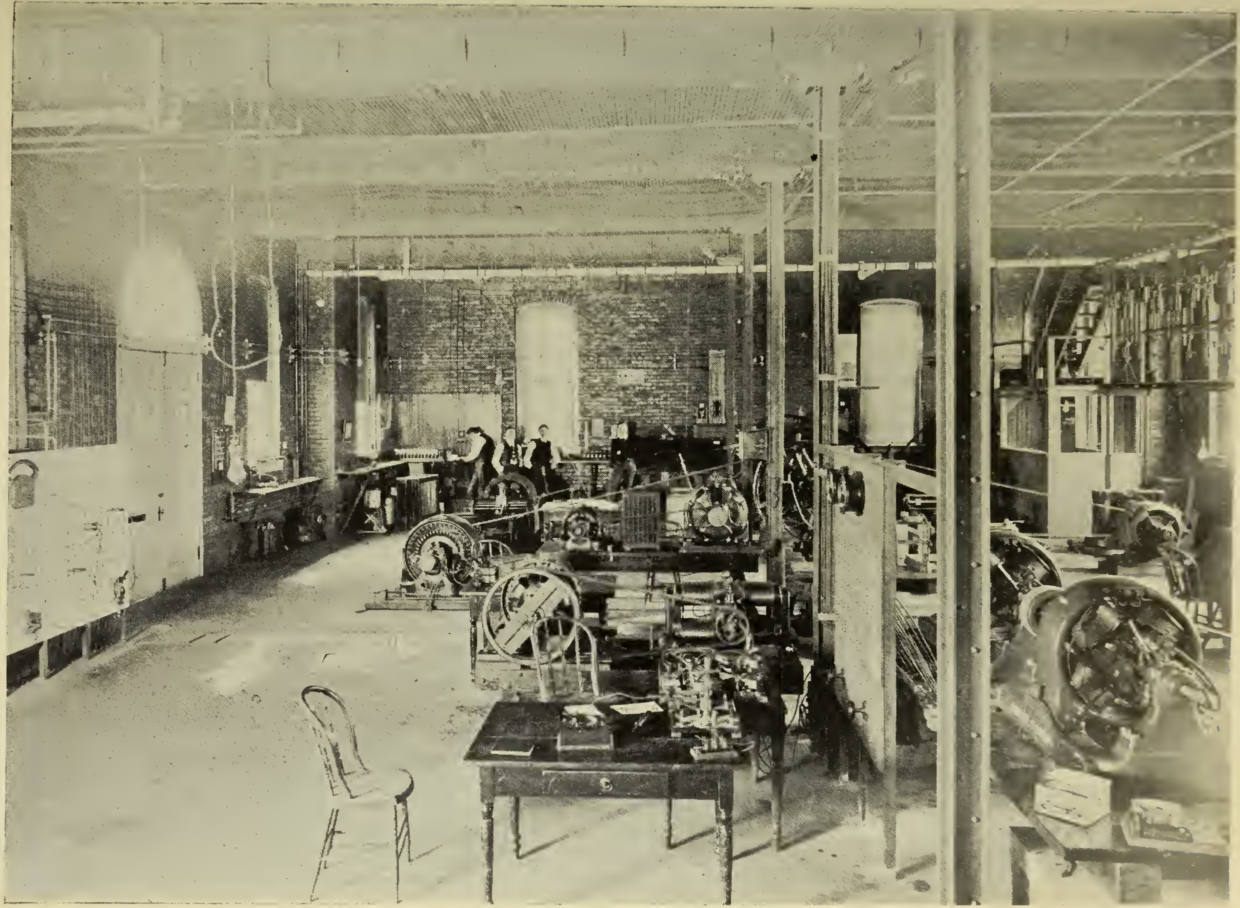
(DEPARTMENT OF ROMANCE LANGUAGES AND LITERATURES)

Office, University Hall, Room 35

Professor Bowen, Associate Professor Bruce, Assistant Professor Batchelder

1. **Elementary French.** Grammar and reader, modern prose and plays. Four credit hours. (First, second and third terms. M. Tu. Th. F. 10 or 11; or Tu. W. Th. F. 2 or 3. Required of all students who offer partial credit in French as their entrance language. Offered as alternative with German 1 and Spanish 1 to those who enter with full or partial credit in Latin, or without previous language training.)

3. **Science Reading.** Four credit hours. (First, second and third terms. M. Tu. Th. F. 10 or 11; or Tu. W. Th. F. 2 or 3. Open to those who have completed Course 1, or its equivalent. Required of all students who offer French as their entrance language.)



ELECTRICAL LABORATORY

GEOLOGY

Office, Orton Hall, Room 1

Professor Prosser, Professor Bownocker

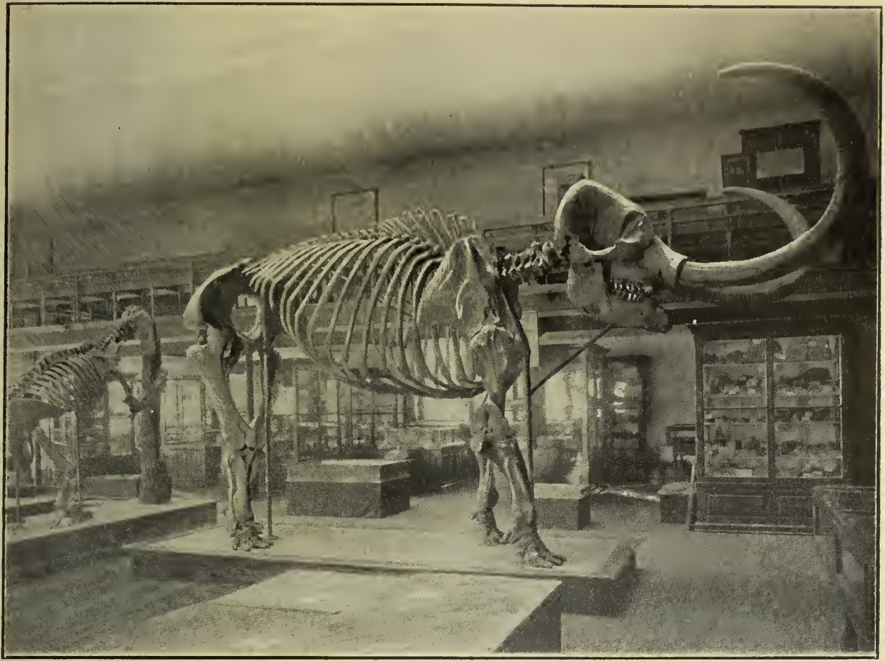
The University is able to present unusual advantages for the study of Geology. By an act of the Legislature it has been put in possession of all the collections made by the late geological survey, and these collections have been supplemented by valuable additions of fossils and minerals from various sources. The State collection embraces a very complete representation of every geological formation shown in Ohio. In its new and ample quarters the Department offers exceptionally good opportunities for work in the lithological and stratigraphical laboratories.

Orton Hall, completed at a cost of more than $100,000, is designed for the permanent accommodation of the large geological collection of the University and for work and instruction in the Department of Geology. A portion of it is occupied by the library and reading room. The building is two stories in height, with a high basement, is built of brick and faced with sandstone, and is fire-proof throughout. Some of the material was contributed by various quarries of the State of Ohio, and almost all of the finer varieties of Ohio building stone are represented in the columns, walls and ceiling panels of the vestibule. At the right of the main entrance is the geological lecture room and professor's private room. The central and rear portion is occupied by the geological and paleontological museums, while the museum of economic geology is in the basement. The laboratories of lithological and stratigraphical geology are on the second floor.

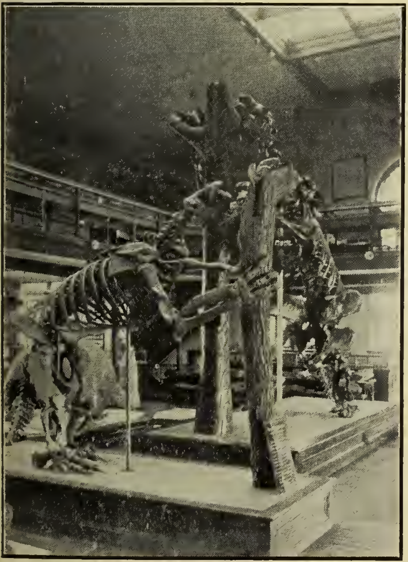
1. **Physiography.** The topographic features of the earth's surface and the agencies producing these. The atmosphere, climate, etc. Oceans, rivers, and lakes. Recitations, lectures, map work. Five credit hours. M. Tu. W. Th. F. 11. (Third term, first year, Short Courses in Mining and Clay Working; second year, Short Course in Industrial Arts.)

2. **General Geology.** Structural, historical and dynamical geology Three hours lectures and recitations, and four hours laboratory and field work. In the laboratory Dana's Manual of Geology, the Ohio Geological Reports and characteristic fossils will be studied. In the field, specimens will be collected, sections measured, formations identified and the student given an idea of the methods of work pursued by a field geologist. Field trips, mainly on Saturdays. Five credit hours. M. Tu. W. Th. F. 11. (First term, fourth year, Courses in Architecture, Ceramics, Civil and Mining Engineering; second year, Short Course in Clay-Working.)

4. **Elementary Geology.** Lithological, dynamical, structural and historical geology. Recitations, lectures, laboratory work. Five credit



GEOLOGICAL MUSEUM



hours. (Second term, second year, M. W. F. 9; M. 1; Th. 8. Short Course in Mining.)

6. **Economic Geology.** Lectures and assigned reading. The nature of ores, their classification and origin. The metals of the United States, their distribution, abundance, modes of occurrence and origin. The non-metals, coal, oil, gas, clay, lime, cement, building stone, etc. In the discussion of the non-metals emphasis will be laid on the products of Ohio. Three credit hours. (Second term, fourth year, M. W. F. 9. Courses in Architecture, Ceramics, Civil and Mining Engineering; second year, Short Course in Clay-working.)

7. **Petrography.** Lectures and laboratory work. The igneous, sedimentary, and metamorphic rocks, — their origin and classification. The volcanic rocks of the Western United States, — their composition, structure and alteration products. The object of this course is to give the student a practical acquaintance with rocks. Two credit hours. (Second term, fourth year, Tu. 9-11; Th. 9. Course in Mining Engineering.)

GERMAN

(DEPARTMENT OF GERMANIC LANGUAGES AND LITERATURES)

Office, University Hall, Room 30

Professor Eggers, Associate Professor Mesloh, Mr. Eisenlohr

1. **Elementary German.** Four credit hours. (First, second and third terms. M. Tu. Th. F. 10 or 11; or Tu. W. Th. F. 2 or 3. Required of all students who offer partial credit in German as their entrance language. Offered as alternative with French 1 and Spanish 1 to all students who enter with full or partial credit in Latin, or without previous language training.)
2. **Science Reading.** Four credit hours. (First, second and third terms. M. Tu. Th. F. 10 or 11; or Tu. W. Th. F. 2 or 3. Open to those who have completed Course 1 or its equivalent. Required of all students who offer German as their entrance language.)

GYMNASIUM

(DEPARTMENT OF PHYSICAL EDUCATION)

Office, Gymnasium

Professor Linhart, Mr. Huddleson

The Gymnasium is a large modern building, completed in 1898. The basement is used for lockers, dressing rooms and baths. The east end is used by the young women, the west end by the young men. Each end has separate shower and plunge baths.

GYMNASIUM

The exercising floor, 80 x 150 feet, is thoroughly equipped with the best apparatus in duplicate. The running track is fourteen laps to the mile, with graded elevations at the curves to meet the requirements of the different rates of speed. The track is laid with felt an inch in thickness, three and a half feet wide and covered with rubber coated canvas.

A thorough physical examination of each student is made in the fall and spring. The measurements are outlined on charts, so as to show the parts below the normal development, for which special exercises suited to the health and physical condition of each individual will be suggested. These charts are constructed from the accumulated data of several thousand measurements of college students. Experience demonstrates that the body, as well as the mind, is susceptible of right and wrong development. Every part of the body can be strengthened and increased and the relation of one part to another can also be changed so as to correct imperfections.

Class leaders are selected from among those who show proficiency in the work. After two years' service those of the leaders showing most capability are given a certificate of their appointment as Student Aides and the letter "A" in scarlet, which they are entitled to wear on their gymnasium suits.

It is the aim of the department to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Gymnasium. The course consists of theoretical and practical work in the gymnasium, and includes calisthenics, light and heavy gymnastics, physiology of exercise, physical examinations and measurements. Two hours a week from December 1 to April 1. (Required of all first and second year students.)

HISTORY

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE)

Office, University Hall, Room 15

Professor Knight, Mr. Rightmire

1. **Political History of the United States.** Text-books and prescribed reading. Thwaites's *The Colonies;* Hart's *Formation of the Union;* Wilson's *Division and Re-Union.* Three credit hours. (Three terms, third year, M. W. F. 8 or 9. Course in Manual Training.)

INDUSTRIAL ARTS

Office, Hayes Hall, Room 2

Professor Sanborn

The shops, which occupy the north wing of Hayes Hall, afford excellent facilities for instruction in both the practical details and the underlying principles of carpentry, pattern-making, forging, moulding, foundry work and machine work.

The carpenter and pattern shop is equipped with twenty-five benches with complete sets of carpenter tools for each and a large number of special tools for general use, twenty-three pattern-maker's turning lathes, with cupboards containing the necessary turning and pattern-making tools under each, an eight-foot pattern-maker's lathe with compound rest, a pony planer, a buzz planer, a circular rip and crosscut saw, a scroll saw, a 36-inch band saw, a trimmer and a power grindstone.

The forge shop is equipped with twenty stationary forges, with anvils and tools for each, a heating forge, a portable hand forge, a foot-power hammer, a blacksmith's drill and punch, shear and bar cutter. The blast for the forges is furnished through under-ground piping by a 45-inch Buffalo pressure blower, and the smoke is removed by a 55-inch Buffalo exhaust fan overhead. Both of these fans are driven by a 15 horse-power electric motor.

The foundry is equipped with a 24-inch Colliau cupola, the blast for which is furnished by a 30-inch Buffalo blower; two brass furnaces, one 16 inches in diameter and the other 20 inches in diameter; a core oven, benches for iron and brass moulding, core-making and cleaning of castings, a space for floor moulding 30 feet by 40 feet, besides all the necessary moulding tools, flasks, crucibles, ladles, tongs, etc.

The machine shop is driven by a 30 horse-power electric motor from above, and is equipped with the following tools: Twenty-eight benches for vise work, with complete set of tools; eight speed lathes, sixteen engine lathes, a Fox monitor turret lathe, two planers, two shapers, two milling machines, two upright drills, a sensitive drill, grinding machines for both plane and cylindrical surfaces, tool grinders, emery wheels, etc. This machinery is furnished with all the necessary tools, and the tool-room is equipped with full sets of drills, taps, dies, milling cutters, standard plugs, gauges, threads, micrometers and a great variety of special tools.

Hayes Hall is a large building of pressed brick and brown sandstone, completed and equipped at a cost of about $70,000. It is devoted to instruction in Industrial Arts, Drawing, Civil Engineering, Mechanical Engineering and Domestic Science. The central portion is three stories high and the front wings are two stories each. On the first floor are

INDUSTRIAL DEPARTMENT—MACHINE SHOP

two offices, the rooms of the Department of Domestic Science and two lecture rooms; besides the machine shop, the forge shop and the foundry. On the second floor are the carpenter and pattern shops, and the Department of Civil Eenginecring, with private rooms annexed. The Department of Drawing occupies the third floor for instruction in mechanical and free-hand drawing and photography.

1. **Tools and Machines.** Lectures and recitations on hand and machine tools and the principles underlying their construction and operation, and materials used in construction. Three credit hours. Tu. Th. S. 8. (First, second and third terms, third year, Courses in Industrial Arts and Manual Training; and second year, Short Course in Industrial Arts.)

2. **Designing.** Problems in design, to accompany Course 1. Three credit hours, F. 1-4, S. 9-12. (Second and third terms, third year, Courses in Industrial Arts and Manual Training; second year, Short Course in Industrial Arts.)

3. **Shop Equipment, Appliances and Management.** A continuation of Course 1. Lectures and recitations on the strength and durability of the materials used in construction; shop and factory buildings and their construction; power, power transmission and prime movers; automatic machines and other special devices for turning out cheap and accurate work; methods of compensation and shop accounts and management. Three credit hours, M. W. F. 11. (First, second and third terms, fourth year, Course in Industrial Arts.)

4. **Advanced Designing.** Problems in the design of buildings and the arrangement of machinery, line-shafting, etc., for manufacturing plants; to accompany Course 3. Three credit hours. (First and second terms, M. Tu. 1-4; third term, W. Th. 1-4; fourth year, Course in Industrial Arts.)

5. **Workshop Appliances.** Lectures and problems on the construction of shop buildings and the arrangement of machinery; power required and the means of transmission; friction in line shafting and the efficiency of machinery; automatic machines and special shop appliances. Three credit hours. (Third term, fourth year, M. W. F. 8, Course in Mechanical Engineering.)

7. **Machine Design.** Practical application of the principles of machine design. Three credit hours. (Third term, third year, M. Tu. 1-4, Course in Electrical Engineering.)

8. **Machine Drawing.** Working sketches of mechanisms and machines from measurement; detail and assembly drawings of same. Three credit hours. (First term, second year, W. Th. 1-4, Short Course in Industrial Arts.)

MATHEMATICS

Office, University Hall, Room 45

Professor Bohannon, Associate Professor McCoard, Associate Professor Boyd, Assistant Professor Arnold, Assistant Professor Swartzel, Assistant Professor Kuhn, Mr. Rasor

1. **Elementary Algebra.** Venable. Five credit hours. (First term, first year, M. Tu. W. Th. F. 9. Short Course in Clay-working.)

2. **Elementary Algebra.** Wentworth. Five credit hours. (First, second and third terms, M. Tu. W. Th. F. 9, first year, Short Courses in Mining and Industrial Arts.)

3. **Plane Geometry.** Venable. Five credit hours. (First term, first year, M. Tu. W. Th. F. 11. Short Courses in Mining and Industrial Arts.)

3a. **Plane Geometry.** Venable. Five credit hours. (Second term, first year, M. Tu. W. Th. F. 9. Short Course in Clay-Working.)

11. **Differential Equations.** Edwards. One credit hour. (First term, third year, F. 10. Course in Mechanical Engineering.)

13. **Solid Geometry.** Venable. Five credit hours. (Second term, first year, M. Tu. W. Th. F. 11. Short Courses in Mining and Industrial Arts.)

31. **College Algebra.** Taylor. Five credit hours. (First term, first year, M. Tu. W. Th. F. 8, 9, 11, 1 or 2. All four-year courses.)

32. **Trigonometry.** Loney. Five credit hours. (Second term, first year, M. Tu. W. Th. F. 8, 9, 11, 1 or 2. All four-year courses.)
Third term, first year, M. Tu. W. Th. F. 8, Short Courses in Industrial Arts and Mining.)

33. **Analytics.** Loney. Five credit hours. (Third term, first year, M. Tu. W. Th. F. 8, 9, 11, 1 or 2. All four-year courses.)

41. **Calculus.** Venable. Edwards. Five credit hours. (First term, second year.)

M. Tu. W. Th. F. 1 — Course in Architecture.
" 8 — Course in Ceramics.
" 8 — Course in Chemical Engineering.
" 11 or 1 — Course in Civil Engineering.
" 8 — Course in Electrical Engineering.
" 8 — Course in Mechanical Engineering.
" 8 — Course in Mining Engineering.

42. **Calculus.** Five credit hours. (Second term, second year. For hours and courses see Course 41.)

43. **Calculus.** Five credit hours. (Third term, second year. For hours and courses see Course 41.

51. **Mechanics.** Statics. Five credit hours. (First term, third year, M. Tu. W. Th. F. 8, 9 or 11. Courses in Architecture, Ceramics, and Chemical, Civil, Electrical, Mechanical and Mining Engineering.)

52. **Mechanics.** Strength of Materials. Kinetics. Five credit hours. (Second term, third year, M. Tu. W. Th. F. 8, 9, 11 or 2. Courses in Architecture, Ceramics, and Chemical, Civil, Electrical, Mechanical and Mining Engineering.)

53. **Mechanics** Kinetics. Hydraulics. Five credit hours. (Third term, third year, M. Tu. W. Th. F. 8, 9 or 11. Courses in Architecture, Ceramics, and Chemical, Civil, Electrical, Mechanical and Mining Engineering.)

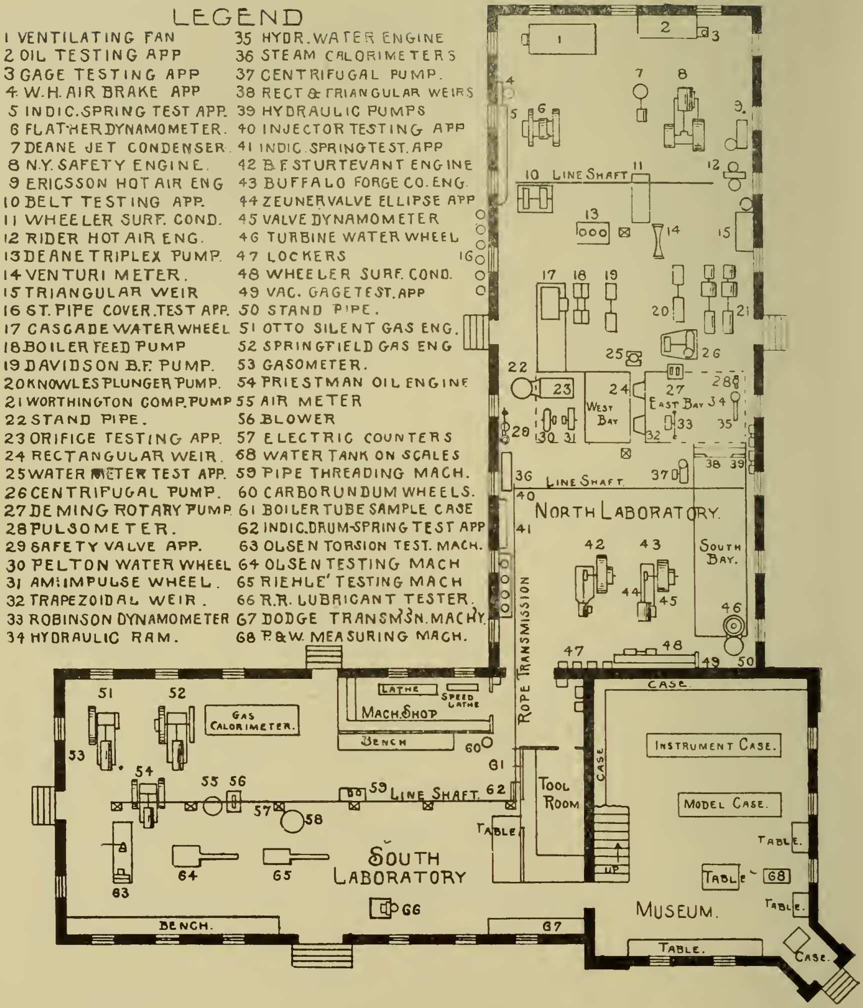
MECHANICAL ENGINEERING

Office, Hayes Hall, Room 11

Professor Magruder, Professor Hitchcock, Assistant Professor ———, Mr Bailey, Mr. Yost

The lectures and recitations of this Department are held in rooms Nos. 11 and 12 of Hayes Hall, and in the lecture room of the Mechanical Hall. Mechanical Hall is a brick building, 93 feet front by 32 feet deep, with a wing 32 by 80 feet. The lecture room is on the second floor, and is provided also with drawing tables. The main floor has three large rooms. The Museum is fitted with glass cases which contain the more delicate apparatus, measuring machines and other instruments of precision, samples of engineering supplies and specimens of materials which have been tested and broken either in the laboratory or in practice. It also contains a collection of models of mechanisms and valve gears.

The south laboratory is used for applied mechanics and for gas engineering. Here are located the machines for testing the strengths and elasticities of engineering materials, and recording their physical properties automatically and autographically. Oils are tested as lubricants. The gas engine plant has three engines, using gas, gasoline or oil. These illustrate three methods of ignition, and fly ball and inertia governors. The air may be supplied by a fan through a large meter. Measurements are taken of the temperatures and pressures of the air, gas and water used. The fresh and burnt gases are analyzed and their heating values determined by a calorimeter. The power is measured with both the indicator and the brake. The laboratory machine shop and tool room are in this room.



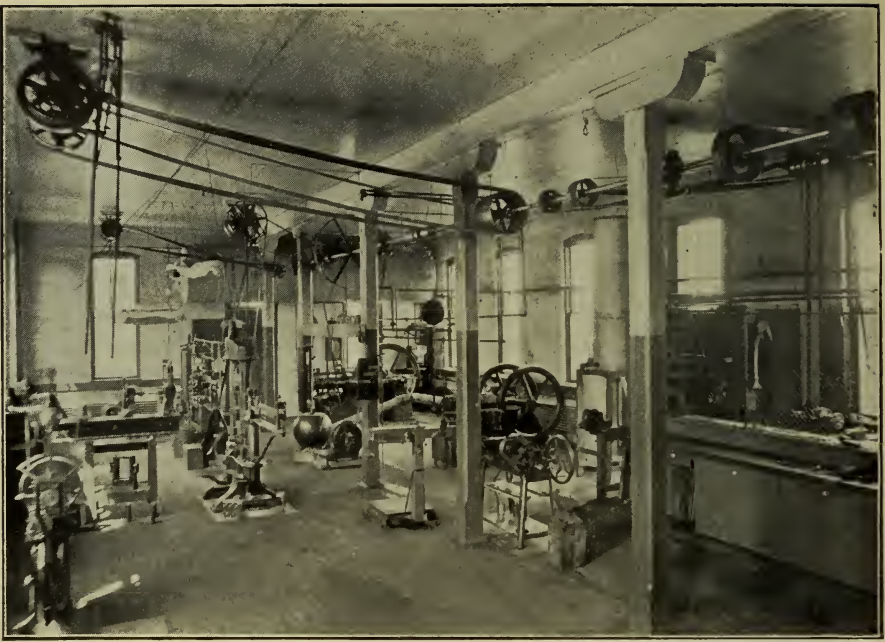
GROUND PLAN
OF
EXPERIMENTAL ENGINEERING LABORATORY.

The north laboratory is used as a steam engineering and hydraulic laboratory. Three 35-horse-power engines give facilities for testing single or twin, condensing or non-condensing, simple or compound, throttling or automatic cut-off engines, using either jet or surface condensers. Pressure and vacuum gauges are calibrated. Indicator springs of five makers are tested both cold and hot. Five kinds of calorimeters determine the moisture in steam before and after passing three different separators. Injectors are tested for lift, quantity, pressure and steam consumption. Simple and compound steam pumps of six makes (ranging to 1200 gallons per minute capacity), two centrifugal, a triplex power and a rotary pump, are available for testing. They deliver water at pressure up to 150 pounds to two stand-pipes. These in turn supply turbine, Cascade, Pelton and American impulse water wheels, and also enable experiments to be made on the flow of water through orifices, pipes, valves, etc. Three cisterns, provided with a variety of weirs up to five feet wide, give practice in measuring flowing water. A Venturi meter and Pitot tubes are also used. Ericsson and Rider hot air engines are tested. A Rife hydraulic engine, a Humphreys ram, Gem and Eureka water motors, and a pulsometer, are included in the hydraulic apparatus, all of which are connected and prepared for complete tests. Oils are tested for their viscosity and other physical properties.

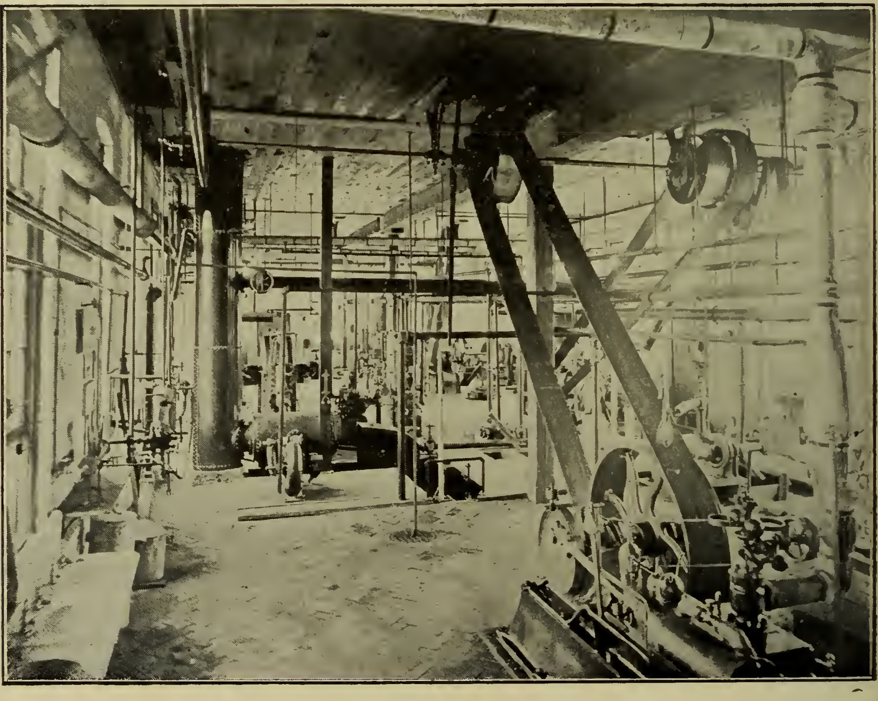
A complete set of Westinghouse air-brake apparatus, a steam-driven air compressor, a compressed air engine, and an air meter are used in studying the subject of compressed air. These, together with a blower and a ventilating fan, enable experiments to be performed in the flow of air. They in turn are supplemented by tests of the heating and ventilating plants in the buildings on the campus. Belts and pulleys are tested for their slippage, friction and horse-power transmitted.

The Robinson experiment boiler gives unexcelled facilities both for laboratory exercises in the use, care and testing of steam boilers, and for the solution of original problems in this branch of engineering practice and research.

In addition to the apparatus and equipment of the power plant of the University (for description see page 104), the power house at Townshend Hall contains a horizontal, return tubular boiler, two steam engines and a six-ton ammonia compression refrigerating machine fitted up with thermometers and an ammonia meter, and prepared for making complete tests, thereby making the facilities on the campus for engineering testing quite complete. Machinery, apparatus and appliances are continually being presented, built or purchased, and the student is given an opportunity to test everything under the practical conditions of operation. Besides the laboratory facilities, opportunities frequently arise to test machinery, engines or boilers in the city, and in these tests the students take part.



EXPERIMENTAL ENGINEERING LABORATORY
GAS ENGINES AND TESTING APPARATUS



EXPERIMENTAL ENGINEERING LABORATORY
STEAM ENGINES AND HYDRAULIC MACHINES

3. **Mechanism.** Lectures and recitations on the principles of mechanism and mechanical movements. Five credit hours. (Second term, third year, M. Tu. W. Th. F. 8 or M. Tu. Th. F. 10, S. 8. Courses in Electrical and Mechanical Engineering.)

The accurate laying out of movements, embodying the principles of mechanism. Two credit hours. (Third term, third year, M. Tu. 1-3. Course in Mechanical Engineering.)

12. **Experimental Engineering Laboratory.** Calibration of pressure gauges and indicator springs; steam engine indicator practice and oil testing. Two credit hours. (First term, third year, M. or W. 1-5. Course in Mechanical Engineering.)
14. Continuation of Course 27. Four credit hours. (Second term, fourth year, M. Tu. 1-5; or W. Th. 1-5. Course in Mechanical Engineering.)
15. Continuation of Course 14. Testing of steam boilers, injectors, steam, centrifugal and power pumps, pulsometer and hydraulic rams. Three credit hours. (Third term, fourth year, M. Tu. 9-12; or Th. F. 9-12. Course in Mechanical Engineering.)

17. **Experimental Engineering.** Practice in the testing of materials of construction, calibration of orifices and weirs, study of the flow of liquids and gases, accompanied by lectures and recitations on laboratory practice, steam engines, boilers and power transmission. Three credit hours. (Second term, fourth year, Th. 11, F. 1-5. Course in Civil Engineering.)

18. **Machine Design.** Recitations on Unwin's Machine Design, with lectures on American practice. Five credit hours. (Fourth year, first term, M. Tu. W. Th. F. 11, Course in Chemical Engineering; M. Tu. W. Th. F. 9, Course in Mechanical Engineering; second term, M. Tu. W. Th. F. 11, Courses in Chemical and Mechanical Engineering.)

19. **Machine Design.** Practical applications of the principles of machine design. Five credit hours. (Third term, fourth year, M. 1-5, Tu. W. 1-4. Courses in Chemical and Mechanical Engineering.)

21. **Thesis Work.** Five credit hours. (Third term, fourth year. Course in Mechanical Engineering.)

22. **Timber and Masonry.** Lectures on the construction of foundations and structures in timber and masonry. Three credit hours. (The last three-fifths of second term, third year, M. Tu. W. Th. F. 9. Courses in Industrial Arts and Mechanical Engineering.)

23. **Materials of Construction.** Lectures on the materials used in architectural and building construction, and laboratory exercises on their properties. Four credit hours. (First term, fourth year, M. Tu. 9; F. 1-5. Course in Architecture.)

24. **Experimental Engineering Laboratory.** Arranged to meet the needs of those desiring to elect advanced laboratory work. Three credit hours. (First and second terms. Elective to third and fourth year engineers.)

25. Continuation of Course 17. Tests of steam, power, rotary and centrifugal pumps; water motor and turbine wheel. For those not having had Course 17, laboratory practice in testing of pressure gauges, indicator springs, steam engine indicator practice, testing of steam engines and valve setting; steam, power and centrifugal pump tests and boiler fuel trials, accompanied by lectures and recitations on power transmission, steam engines and boilers. Five credit hours. (Third term, fourth year, Tu. Th. 10, M. Tu. 2-5; or Tu. Th. 10, W. Th. 1-4. Courses in Ceramics, and in Civil and Mining Engineering.)

27. Continuation of Course 12. Testing materials of construction, steam engine, hot air engine and air compressor tests, transmission and absorption dynamometer trials and testing of belts. Five credit hours. (First term, fourth year, W. Th. 11, 11, 1-5; or M. F. 11, 11, 1-5. Course in Mechanical Engineering.)

28. **Experimental Engineering Laboratory.** Testing materials of construction, transmission and absorption dynamometer tests, testing of lubricating oils. Two credit hours. (Third term, third year, Th. or F. 1-5. Course in Electrical Engineering. First term, fourth year, Th. 1-5, Course in Industrial Arts. Third term, fourth year, F. 1-5, Course in Manual Training.)

29. Continuation of Course 28. Testing of pressure guages and indicator springs, steam engine indicator practice and steam engine trials. Three credit hours. (First term, fourth year, Tu. Th. 1-4. Course in Electrical Engineering.) Two credit hours. (Second term, fourth year, W. 1-5. Course in Industrial Arts.)

30. Continuation of Course 29. Steam engine and boiler trials, steam and power pump tests and hydraulic experimentation. Two credit hours. (Second term, fourth year, S. 8-12. Course in Electrical Engineering. Third term, fourth year, F. 1-5. Course in Industrial Arts.)

31. **Hydraulic Machinery.** Recitations and lectures on pumping machinery. Three times a week. (Third term, fourth year, Tu. Th. S. 8. Course in Mechanical Engineering.)

32. **Mechanical Engineering of Power Plants.** A descriptive study of steam and gas engines, boilers, pumps, injectors and other machinery used in plants generating power. Five credit hours. (Third term, third year, M. Tu. W. Th. F. 9. Courses in Chemical and Electrical Engineering and Industrial Arts; M. Tu. W. Th. F. 11, Course in Mechanical Engineering. Third term, fourth year, M. Tu. W. Th. F. 9. Course in Manual Training.)

33. **Steam Engines and Boilers.** A detail study of steam using and steam generating machinery. Five credit hours. (First term, fourth year, M. Tu. W. Th. F. 8. Courses in Electrical and Mechanical Engineering.)

34. **Thermodynamics.** Lectures and recitations on the transmutations of heat and mechanical energies in steam, gas and air engines, and in air and ammonia compressors, together with a study of the tests of ideal and actual engines and of their indicator diagrams; the flow of gases through pipes and orifices. Five credit hours. (Second term, fourth year, M. Tu. W. Th. F. 8. Course in Mechanical Engineering.)

35. **Experimental Engineering Laboratory.** Five credit hours. (Second term, fourth year, M. 9, M. Tu. 1-5. Option in Course in Chemical Engineering.)

METALLURGY

(DEPARTMENT OF METALLURGY AND MINERALOGY)

Office, Chemical Hall, Room 5

Professor N. W. Lord, Mr. Somermeier, Mr. ———

The Department of Metallurgy and Mineralogy occupies the eastern part of Chemical Hall. In the basement are the smelting furnaces, the assay laboratory, a room for rough work, and store rooms for supplies. On the first floor is the lecture room of the professor in charge, a laboratory with desks for sixteen students, a store room, a balance room, a private laboratory and office.

The metallurgical laboratory has all the appliances for the most modern methods of technical analysis as practiced in iron and steel laboratories, including gas analysis. A large room in the basement is fitted for gold and silver assaying, with improved muffle and melting furnaces, sampling apparatus and assay balances.

The lecture room in metallurgy has a projection lantern with a large collection of views of machines, mines, and furnaces. There is a photographic room with blue-printing facilities, where students learn to make copies of drawings used in illustrating the lectures.

A collection of minerals and rocks with a large set of rock sections is provided for illustrating the mineralogy, as well as sets of blow-pipe apparatus for the students in determinative mineralogy.

2. **Mineralogy.** Lectures arranged so as to be preparatory to Determinative Mineralogy (Course 3). Three credit hours, M. W. F. 11. (Third term, second year, Courses in Chemical and Mining Engineering; third year, Course in Ceramics.)

ASSAY LABORATORY

3. **Determinative Mineralogy.** Laboratory course in practical determination of minerals by physical and chemical tests. Each student is furnished with a set of apparatus, and works under an instructor's inspection. Brush's Determinative Mineralogy is used as a manual. Five credit hours. (Third term, third year, M. Tu. W. 1-4. Course in Mining Engineering.)

4. **Metallurgy.** A course of lectures upon fuel and its uses, iron and steel, copper, lead, gold and silver, their properties, tests, ores and details of the models of reduction. The lectures are supplemented by a careful study of references to standard works and journals. Five credit hours. M. Tu. W. Th. F. 9. (First and second terms, third year, Courses in Mechanical and Mining Engineering and Industrial Arts; and fourth year, option in Course in Chemical Engineering. First term, fourth year, Course in Ceramics.)

5. **Metallurgical Laboratory.** Lectures and laboratory work. Laboratory practice in the analysis of iron and steel, fuel and slags, and the assay of lead, copper and zinc ores by wet methods, using approved methods as practiced in technical laboratories of metallurgical works. Course 5 must be preceded by Chemistry 7. Five credit hours, W. Th. F. 1-4. (First, second and third terms, second year, Course in Mining Engineering. First term, third year, Course in Chemical Engineering.

6. **Assaying.** Laboratory work. Practical work in the assaying of gold, silver and lead ores, by furnace methods. Five credit hours. (Second term, third year, M. Tu. 11, 1-5. Courses in Chemical and Mining Engineering.)

7. **Metallurgical Construction.** Practice in the designing of furnaces and other metallurgical machinery, including detail drawings and estimates. Three credit hours. (Second term, fourth year, Th. F. 1-4. Course in Mining Engineering.)

8. **Ore Dressing and Coal Washing.** Instruction in the methods of concentrating and enriching ores and fuels by mechanical means. Lectures, with reference to standard books and various papers in technical journals. Two credit hours. (First term, fourth year, Tu. F. 10. Course in Mining Engineering.)

9. **Mineral Chemistry.** Lectures upon fire-damp, mine explosions, explosives, boiler waters, poisonous gases, iron ores; iron and steel, their properties and modes of manufacture; coal and coke. Five credit hours. (Third term, second year, M. Tu. W. Th. F. 8. Short Course in Mining.)

MILITARY DRILL

Office, Armory Room

Captain George L. Converse, U. S. A.

The same building used as a gymnasium is also employed as Armory and Drill Hall by the University Battalion. This is in charge of a Commandant from the United States Army, apart from whom it is officered entirely by the students. Since participation is required of all students during the first two years of their course, the size of the battalion is such as to make interesting maneuvers possible. Besides its military importance as shown by the prominent place taken by former students among the Ohio troops sent to the late war, the great value of this work in the physical development of the student is thoroughly recognized by all educators.

The drill begins with four hours per week in the first term, which is outside, weather permitting. The fall work is largely devoted to squad drill in the setting up exercises, facings, marching, etc., and company drill according to progress of the squads. In December the drill is reduced to two hours per week until April, with one hour additional for theoretical work. During these months drill is confined to work inside the Gymnasium, manual of arms, guard mounting and such ceremonies as can be performed within a limited space. From April 1st to the end of the term all work is outside, weather permitting, four days of each week as follows: Mondays, Company drill; Tuesdays, Battalion drill; Wednesdays, ceremonies other than guard mounting and Thursdays, guard mounting and Company drill. During the entire year and on the same days as enumerated above, the O. S. U. Band either has its practice hour or takes part in ceremonies and drill. Similarly the Signal Corps belonging to the battalion exercises in the flag drill or at telegraph work. The battalion of cadets is modeled after a battalion of U. S. Infantry, and consists of five companies under command of a Cadet Major. Army regulations are followed strictly. The battalion for the year 1901-2 has averaged about five hundred men and officers under command of Cadet Major Hapgood and Captains Crable, Harrop, Bostwick, Wilcox and Ward.

1. **Military Drill.** Four times a week, from the opening of College till the Thanksgiving vacation; twice a week from Thanksgiving till April first; four times a week till the close of the school year. Required of all able-bodied male students during first and second years of their course.

2. **Tactics.** Lectures and recitations. Twice a week. (Second term. Elective.)

4. **Customs of the Service.** Lectures and recitations. Twice a week. (Second term. Required of the whole battalion.)

CADET BATTALION ON DRESS PARADE

MINE ENGINEERING

Office, Chemical Hall, Room 29

Professor Ray

This Department is equipped with all of the latest improved instruments and apparatus used in mine engineering, surveying and the study of mine ventilation. There is a collection of models of mine machinery and supplies, to which additions are being made which are valuable, as illustrations. The draughting room is large, well lighted and provided with a desk for each student, where he is personally taught the making of maps and the platting of actual surface and underground surveys; the making of drawings, tracings and blue-prints. He is also taught proper methods of keeping notes and all records necessary to an efficient engineer's office. The students are given practical experience by making actual surveys of coal mines and in working up their notes complete in all of the necessary details. The students are also taught how to make working drawings, plans, estimates and specifications of mining operations and equipment.

There is a large collection of views of machines, mines and mine equipment for use in the projection lantern in the lecture room. A photographic room with blue-printing facilities is used by the students in making copies of their own drawings and those illustrating the lectures.

The Mining Engineering Course pays special attention to underground surveying, mapping, timbering, ventilation and other matters relating to safety and speed, system and method in extracting coal and other minerals.

The coal mines of central Ohio are easily accessible to the University and furnish an extremely valuable field for illustrating the practical systems and methods of mine surveying, systems of mining, timbering, haulage, drainage and ventilation, tipple construction and general arrangement of mining plants.

During their course the mining students are required to make frequent trips and to spend sufficient time at the mines in actual work and observation to become familiar with practical mine surveying and the details of mine equipment and management. This work is further supplemented by visits to shops or public works, which afford practical illustrations of engineering work in the process of construction.

1. **Mine Surveying.** Lectures and field practice. This is similar to Course 4, but more elementary. The same text is used. The students have more practice in the drawing room. Five credit hours. (First term, second year, M. Tu. W. Th. F. 11. Short Course in Mining.)

LABORATORY FOR METALLURGICAL CHEMISTRY

MINING ENGINEERING LABORATORY — FANS AND COMPRESSER

2. **Ventilation and Haulage.** Lectures illustrated by experiments and maps of mines and models when possible, tests by safety lamps and anemomoters, and methods of air distribution in coal mines. Five credit hours. (Second term, second year, M. Tu. W. Th. F. 11. Short Course in Mining.)

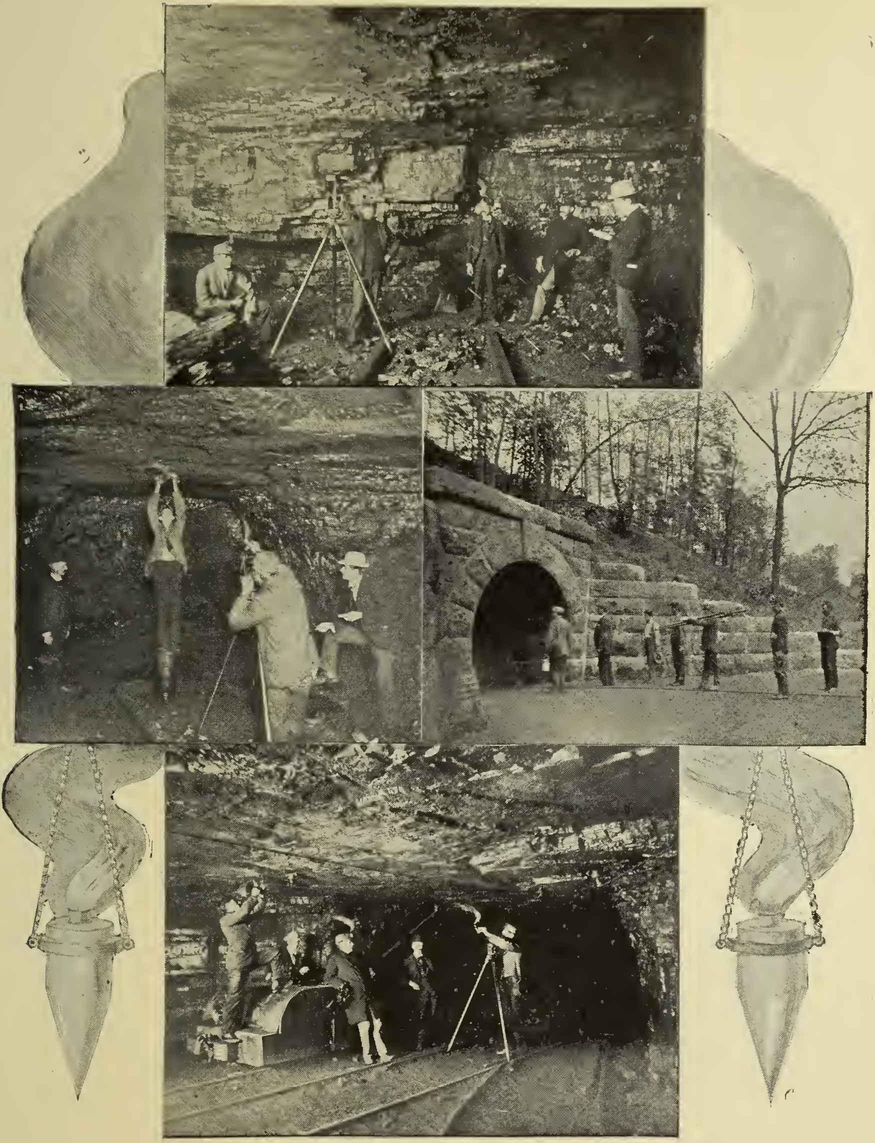
3. **Mine Operating.** A course of lectures and practical instruction in mine book-keeping and accounts, cost of working, etc., particularly adapted to Ohio coal mining. Five credit hours. (Third term, second year, Tu. Th. F. 10; M. 9-11. Short Course in Mining.)

4. **Mine Surveying.** Field practice in the use of instruments for surface and underground surveys. Full notes are taken and maps and plans made in the drawing room. Davies's Surveying by Van Amringe is used as a text-book. Five credit hours. (First term, third year, M. Tu. Th. F. 10; M 1-3. Courses in Mining Engineering and Ceramics.)

5. **Mine Engineering.** Lectures. Mine operating, mining machinery, ventilation, shaft-sinking, working out deposits, etc. Constant reference is required to the standard works and to the leading technical journals., with practice in designing mine plants, draughting and estimates. Five credit hours. (First, second and third terms, fourth year, M. Tu. W. Th. F. 8. Course in Mining Engineering.)

6. **Plans and Specifications.** Five credit hours. (Third term, fourth year, M. Tu. W. Th. F. 11. Course in Mining Engineering.)

7. **Surveying.** Practical experience in surveying in some mine convenient to Columbus; the time taken in one trip of not more than four consecutive days. One credit hour. (Second term, third year, Course in Mining Engineering.)



CLASS IN MINING ENGINEERING AT WORK SURVEYING IN COAL MINE

PHYSICS

Office, University Hall, Room 13

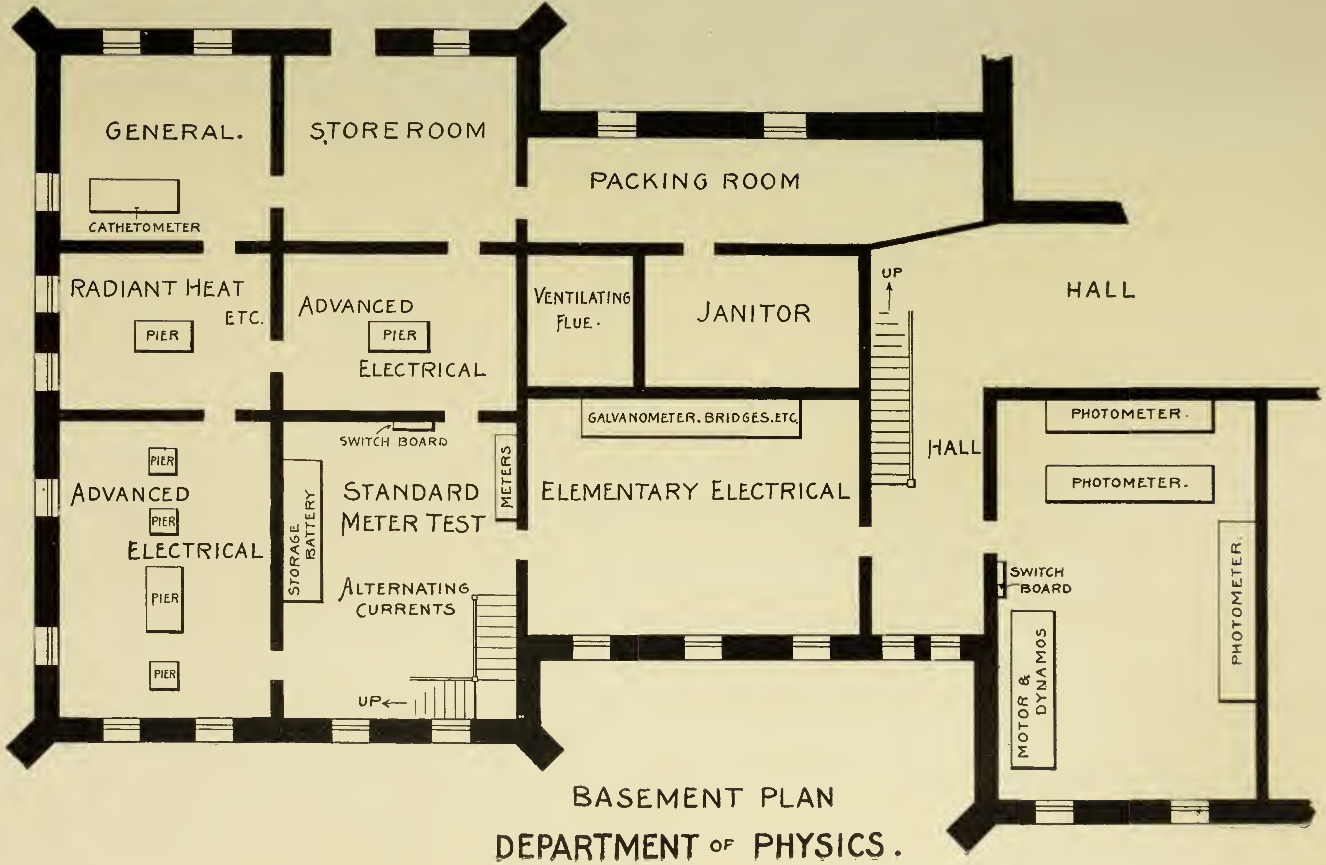
Professor Thomas, Professor Cole, Assistant Professor Kester, Mr. ———,

The Department of Physics occupies the west half of the first two floors and basement of University Hall. The first floor rooms are the principal lecture room, fifty-five by thirty-eight feet; the elementary lecture room; an instrument room; and the office of the Department.

On the second floor are rooms for elementary laboratory work, and a dark room for photographic work, in connection with spectrum and Roentgen-ray apparatus. The lecture room on the first floor is also used in laboratory work. In the basement, provision is made for advanced exercises in electricity, heat, etc. The basement plan on an adjoining page gives a general idea of its arrangement, and of the character of the work provided for.

The Department has an excellent equipment of apparatus, to which additions are constantly being made. The apparatus includes a large collection of pieces for illustration of the general lecture room work, but is principally chosen for accurate measurement in the laboratory. A set of standards of length, capacity and mass, sent under the act of Congress supplying such sets to the several agricultural colleges, is in the possession of the Department. The pieces are copies of the United States standards made by the Coast Survey at Washington.

Among the principal pieces of apparatus are a dividing machine by Fauth & Co.; chronometers by Parkinson & Frodsham and by Negus, the latter a break-circuit; a chronograph by Fauth & Co.; a Hipp's chronoscope; cathetometers by Salleron and by the Geneva Society, the latter an exceptionally fine instrument; Regnault's apparatus for vapor tension, for expansion of gases and for specific heat; Melloni-Tyndall apparatus for radiant heat; standard thermometers by Baudin and others; Rutherford and Rowland diffraction gratings; Rowland's spectrum photographs, spectroscopes by Brashear, Browning, Apps and others; Salleron's complete apparatus for projections in polarized light; lanterns for projections by the lime light and the arc light; a variety of sound apparatus from Koenig; portable and quadrant electrometers; Kelvin galvanometers of high and low resistance; Wiedemann, Kohlrausch and other galvanometers; standard resistance coils, with Cavendish laboratory certificate; several sets of resistance coils and bridges; a Kew magnotometer; Kelvin Standard balances; Weston ammeters and voltmeters; standards of self-induction; standard battery cells; photometric standards and photometers; X-ray apparatus, etc.



BASEMENT PLAN
DEPARTMENT OF PHYSICS.

Under the laws of Ohio, the professor of Physics is ex-officio State Sealer of Weights and Measures, and all of the standard weights, measures and balances received from the United States government are in the rooms of the Department.

1. **Elementary Physics.** Recitations and experimental lectures. Five credit hours. Text: Carhart & Chutes' "Elements of Physics." (First and second terms, first year, M. Tu. W. Th. F. 8, Short Course in Mining; M. T. F. 10; W. Th. 11, Short Course in Clay-working; and second year, M. T. F. 10; W. Th. 11, Short Course in Industrial Arts.)
2. **Mechanics and Heat. Electricity and Magnetism. Sound and Light.** Lectures and recitations. Three credit hours. (First, second and third terms, second year, M. W. F. 9, all four-year courses.)
3. **Physics.** Extension of Course 2, with practice in solution of problems. Two credit hours. (First, second and third terms, second year, Tu. Th. 9. Courses in Electrical Engineering, Ceramics, Industrial Arts and Manual Training.)
4. **Electricity and Magnetism.** Lectures and recitations. Three credit hours. (First term, third year, M. Tu. Th. 10. Course in Electrical Engineering.)
5. **Physical Laboratory.** Elementary manipulation. Length, mass and time measurements. Work in density, elasticity and in heat. Four credit hours. (Third term, second year, M. Tu. 1-4, W. 1-3; or W. 1-3, Th. F. 1-4. Course in Electrical Engineering.) (Alternative with Chemistry 20 and 21. First, second and third terms, third year, Course in Manual Training.)
6. **Physical Laboratory.** Theory and practice of magnetic and electrical measurement, including the testing and standardizing of instruments; conductivity of conductors; insulation, capacity and resistance of insulated conductors and cables; temperature co-efficients; commercial measuring and testing instruments; strength and distribution of magnetic fields; magnetic moments, permeability; work in light, including optical constants; spectroscopy; photometry of gas, electric and other lights. Five credit hours. (First and second terms, third year, M. Tu. W. 1-4. Course in Electrical Engineering.)
7. **Physical Laboratory.** (Two credit hours, second term, M. Tu. or Th. F. 1-3; three credit hours, third term; second year, M. Tu. or Th. F. 1-4, Course in Mechanical Engineering.) Three to five credit hours. (First, second and third terms. Elective.)
9. **Physical Laboratory.** A second year's work in Physical Laboratory. Three to five credit hours. Course 9 must be preceded by Course 6 or Course 7. Elective.

POLITICAL SCIENCE

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE)

Office, University Hall, Room 15

Professor Knight, Assistant Professor Smith

1. **Political Institutions of the United States.** Lectures and recitations. A study of the origin and nature of the political institutions of the United States, and an analysis of the form and powers of the government. Bryce's *American Commonwealth;* Burgess's *Political Science.* Three credit hours. Open only to students who have had American History 1. (First term, fourth year, M. W. F. 8. Course in Manual Training.)

RHETORIC

(DEPARTMENT OF RHETORIC AND ENGLISH LANGUAGE)

Office, University Hall, Room 44

Professor Denney, Assistant Professors Graves, McKnight and Allen

1. **Paragraph Writing and Analysis of Prose.** Two credit hours. (First, second and third terms, first year, M. Th. 8; Tu. F. 8; or Tu. Th. 9, 10 or 1. All four-year courses.)

2. **Expository Writing.** Two credit hours. (First term, second year, M. F. 10; or Tu. Th. 10; or Tu. F. 11; or W. F. 1. Courses in Industrial Arts, Manual Training, and Electrical and Mechanical Engineering; third year, Courses in Architecture, Ceramics, Chemistry, and Civil and Mining Engineering.)

3. **Brief-making and Written Argumentation.** Two credit hours. (Second term, M. F. 10; or Tu. Th. 10; or Tu. F. 11. Third term, M. F. 10; or Tu. Th. 10. Years and courses as in 2.)

10. **Advanced Composition.** One credit hour. Three terms. Elective.

21. **Essentials of Oral Discourse.** One half credit hour. (First, second and third terms, first year. M. 8, 10, 1, 2; Tu. 8; W. 9, 11, 1, 4; Th. 8, 9; or F. 8. All four-year courses.)

SHOPWORK

(DEPARTMENT OF INDUSTRIAL ARTS)

Office, Hayes Hall, Room 2

Professor Sanborn, Assistant Professor Knight, Mr. Renck, Mr. Crowe

NOTE — For time requirements, credit given, and all similar information concerning shopwork courses, see table page 100.

3. **Foundry Work.** Exercises and practice in tempering sand and preparing moulds of machine parts in the sand, core-making, melting iron and brass and pouring castings.

4. **Chipping and Filing.** Exercises and practice in vise work, including chipping in cast and wrought iron, surface filing, squaring, fitting, finishing, and the scraping of surface plates.

7. **Carpentry and Pattern Making.** Exercises and practice in carpentry, wood-turning and pattern making, including sawing, planing, mortising, splicing, framing and other work involving the use of the ordinary carpenter tools; center and chuck turning; the making of finished patterns; and enough elementary molding to illustrate draft, parting, cores, etc.

8. **Carpentry: Cabinet Work.** Exercise and practice in cabinet making, including panelling, mitre and dovetail joints, etc.; use of power tools.

9. **Advanced Pattern Making.** Continuation of pattern work of Shopwork 7.

11. **Forging.** The use and care of forge, fire and tools; practice in iron and steel forging, including such operations as cutting, bending, drawing, upsetting, shaping and welding iron; the making, hardening and tempering of steel punches, chisels and lathe tools.

12. **Advanced Forging.** Various forms of welds in iron and steel; the use of scrolling irons and of forms for duplicating work; annealing; tool making; case-hardening; tempering drills, dies and cutters; spring making; ornamental iron work; visits to shops.

13. **Machine Work.** Exercises and practice in hand-turning in iron and brass on speed lathes; in straight and taper turning, boring, fitting, chucking, and thread-cutting on engine lathes.

14. **Machine Work.** Exercises and practice on the lathe, planer, shaper, drill press and milling machine, with use of small tools as drills, taps, dies, reamers, counterborers, etc; construction of parts of actual machines.

INDUSTRIAL ARTS DEPARTMENT—WOODWORKING ROOM.

15. **Advanced Machine Work.** Exercises and practice on turret lathe, universal, surface and tool grinding machines; in gear cutting, etc.

16. **Advanced Machine Work.** The construction and use of jigs and templates; the accurate laying out of work; the duplication of parts, the production of work rapidly and economically, etc.

17. **Advanced Machine Work.** The making and use of special tools and fixtures, standard plugs and collars, standard caliper and limit gauges; error limits in modern machine construction; methods of testing the accuracy of machine tools, etc.

SUMMER TERM

The Summer Term in Shopwork will begin on Mondoy morning preceding Commencement Day and continue for four weeks. The courses open to students are Shopwork (4) (7) (11) (13) (14) and (15), three credit hours in each.

Each course requires three hours a day for six days a week. Students electing the Electrical or Mechanical Engineering Courses are required to take two of the three courses, Shopwork (4), (7) and (11), at the close of their first year.

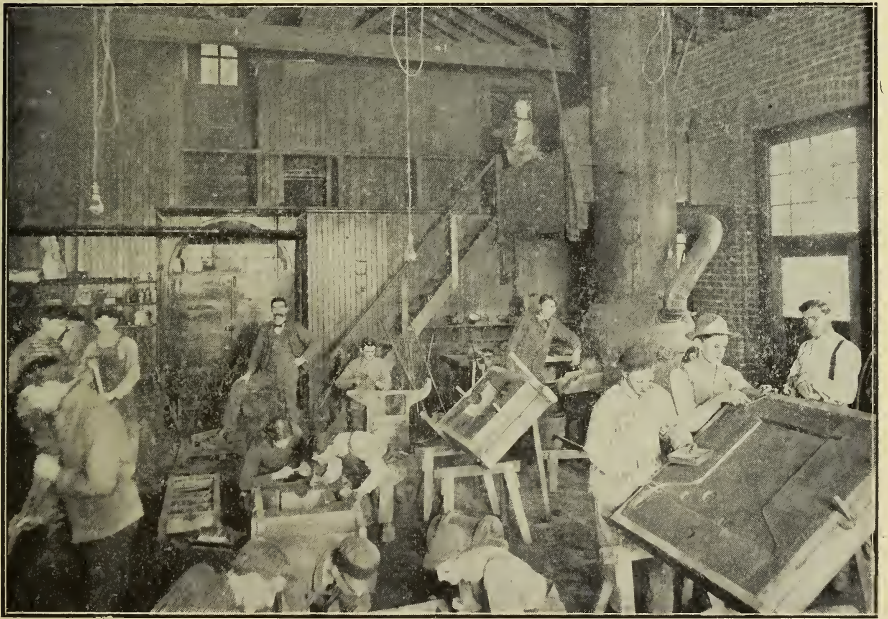
Students electing the Chemical Engineering Course are required to take Shopwork courses (7) and (11) at the close of their first or second year.

The courses are open as elective to students who desire to lighten their work of the regular terms, to make up back work or to take extra work.

Shopwork Required.

Number	Credit hours	Subject	Year	Term	Hours	Courses in
3	2	Founding	2	1	Th. 1-5; or S. 8-12	Mech. Eng.
3	2	Founding	2	1	Tu. 1-5	Short Ind. Arts.
3	3	Founding	2	1	M. 2-4; Tu. 1-5	Ind. Arts; Manual Train.
4	2	Chipping and Filing	1	3	M. Tu. 1-3	Short Clayworking.
4	3	Chipping and Filing	2	1	F. 1-4; S. 8-11	Short Ind. Arts.
4	3	Chipping and Filing	...	...	(See Courses)	Elec. Eng.; Mech. Eng.
4	3	Chipping and Filing	4	1	M. Tu. 1-4	Ceramics.
4	3	Chipping and Filing	3	1	M. Tu. 1-4	Ind. Arts.
4	3	Chipping and Filing	3	1	M. Tu. Th. 10-12	Manual Train.
7	2	Woodworking	2	1	M. F. 10-12	Mining Eng.
7	3	Woodworking	1	1	M. Tu. 1-4	Short Ind. Arts.
7	3	Woodworking	2	1	W. Th. 1-4	Manual Train.
7	3	Woodworking	2	1	F. 1-4; S. 8-11	Ind. Arts.
7	3	Woodworking	...	...	(See Courses)	Chem., Elec. and Mech. E.
8	3	Cabinet work	2	3	M. Tu. 1-4	Ind. Arts; Manual Train.

INDUSTRIAL ARTS DEPARTMENT — FORGE ROOM



INDUSTRIAL ARTS DEPARTMENT — FOUNDRY

Shopwork Required — Concluded

Number	Credit hours	Subject	Year	Term	Hours	Courses in
9	3	Adv. Pattern work	1	2	M. Tu. 1-4	Short Ind. Arts.
9	3	Adv. Pattern work	2	2	M. Tu. 1-4	Ind. Arts; Manual Train.
9	3	Adv. Pattern work	...	...	(See Course)	Mech. Eng.
11	3	Forging	...	...	(See Courses)	Chem., Elec. & Mech. Eng.
11	2	Forging	2	2	M. F. 10-12	Mining Eng.
11	3	Forging	2	2	F. 1-4; S. 8-11	Ind. Arts; Manual Train.
11	3	Forging	1	3	M. Tu. Th. 10-12	Short Ind. Arts.
11	3	Forging	1	3	M. Tu. 1-4	Short Mining.
11	3	Forging	1	3	W. Th. 1-4	Short Clayworking.
11	3	Forging	3	3	W. Th. 1-4	Ceramics.
12	3	Adv. Forging	2	3	F. 1-4; S. 8-11	Ind. Arts; Manual Train.
13	3	Machine work	2	2	M. Tu. 1-4; or W. Th. 1-4, or F. 1-4; S 8-11	Elec. Eng.
13	3	Machine work	3	2	M. Tu. 1-4	Manual Train.
13	3	Machine work	3	2	M. Tu. Th. 10-12	Ind. Arts.
13	3	Machine work	2	2	W. Th. 1-4	Short Ind. Arts.
13	3	Machine work	2	3	M. Tu. 1-4; or F. 1-4; S. 8-11	Mech. Eng.
14	3	Adv. Machine work	3	1	M. Tu. W. 8-10; or Th. F. S. 8-10	Elec. Eng.
14	3	Adv. Machine work	3	1	M. Tu. Th. 8-10; or M. Tu. 1-4	Mech. Eng.
14	3	Adv. Machine work	2	3	Th. F. 1-4	Short Ind. Arts.
14	3	Adv. Machine work	3	3	M. Tu. Th. 8-10	Manual Train.
14	3	Adv. Machine work	3	3	M. Tu. 1-4	Ind. Arts.
15	3	Adv. Machine work	4	1	F. 1-4; S. 8-11	Ind. Arts; Manual Train.
15	4	Adv. Machine work	3	2	M. Tu. Th. F. 10-12; or Th. 2-4; F. 1-4; S. 9-12	Mech. Eng.
16	3	Adv. Machine work	4	2	M. W. F. 8-10	Ind. Arts; Manual Train.
17	3	Adv. Machine work	4	3	M. Tu. 1-4	Ind. Arts.

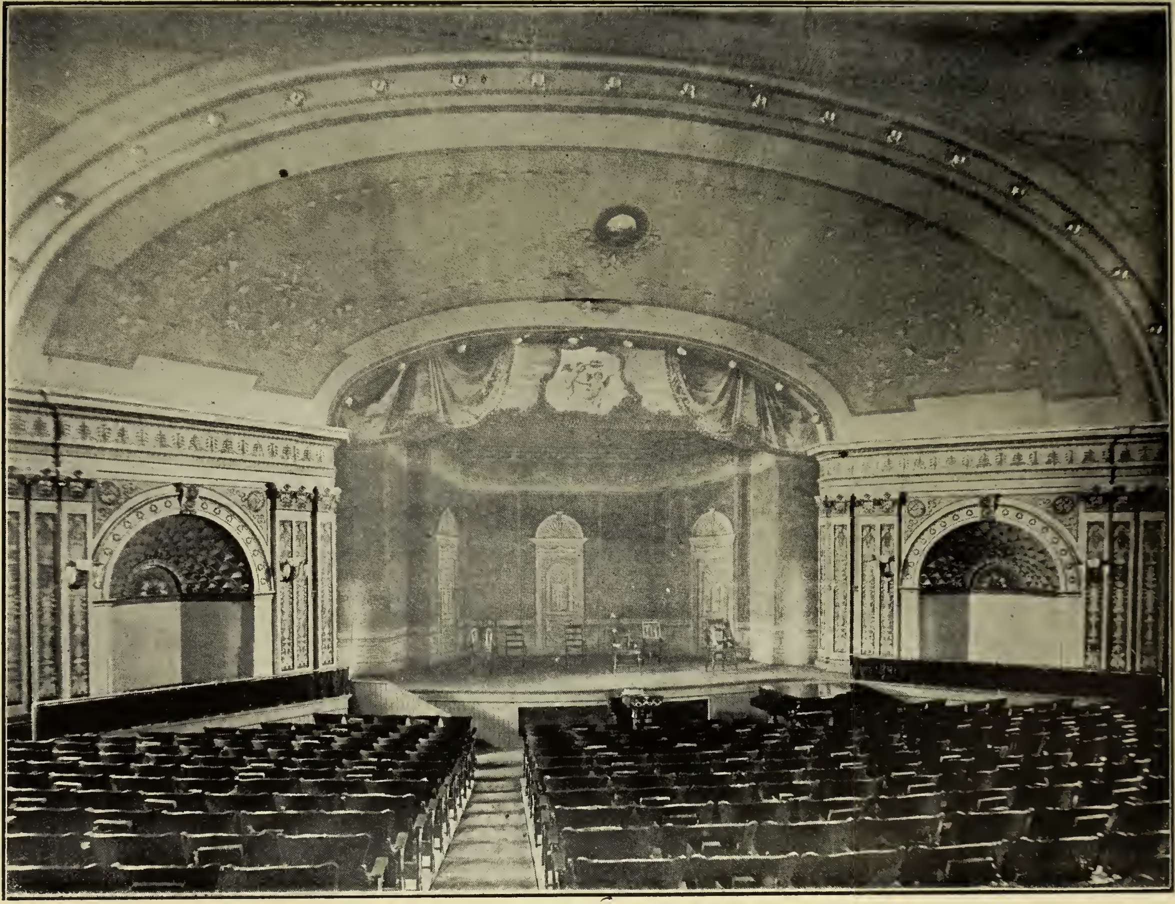
SPANISH

(DEPARTMENT OF ROMANCE LANGUAGES AND LITERATURE)

Office, University Hall, Room 35

Professor Bowen, Assistant Professor Batchelder

1 **Elementary Spanish.** Grammar and reader; modern stories and plays; composition and conversation. Four times a week. (First, second and third terms, M. Tu. Th. F. 11. Offered as an alternative with French 1 and German 1 to those who enter with full or partial credit in Latin or without previous language training.)



AUDITORIUM

THE UNIVERSITY POWER PLANT

The buildings comprising the power plant were completed in 1896, and with the machinery installed, form a model plant. The boiler room is 38 x 100 feet, and is equipped with six 150 H. P. Babcock & Wilcox boilers, with four Murphy Automatic Stokers and two Babcock & Wilcox chain grates. The plant is provided with coal handling machinery.

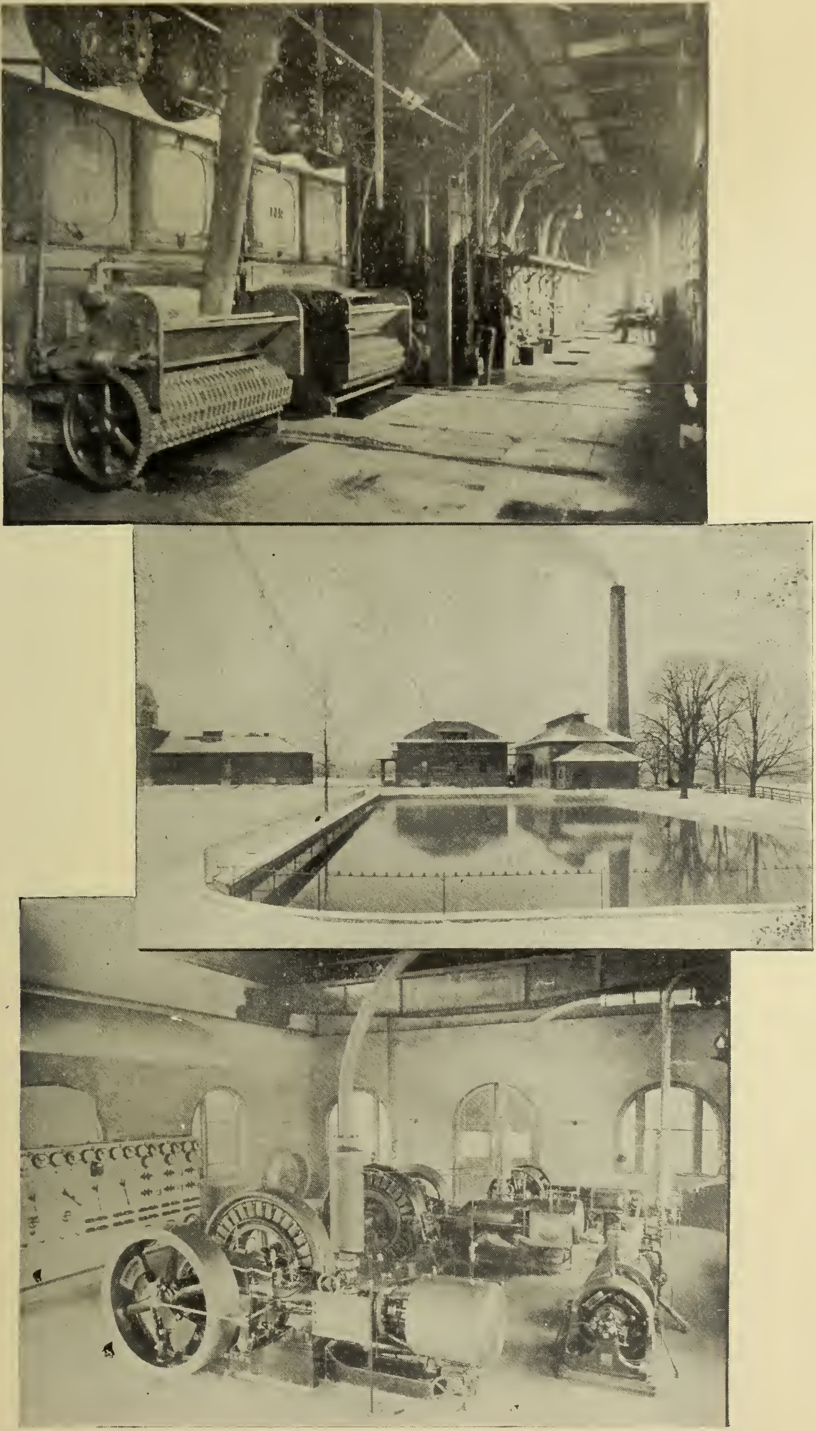
The coal house is at one end of the boiler house; at the other end is the pump and receiver pit, from which runs the tunnel (about 4,300 feet in length) to the various buildings on the campus. In this tunnel are the heating mains, gas and water mains, power, light and other wires.

The power house is separated from the boiler house by a 15-foot alley. This building is 40 x 60 feet in the clear with 20′ side walls. The power generating plant consists of one 70 H. P. McEwen tandem compound engine, belted to a 60 k. w. 2-phase Westinghouse A. C. generator, and two, 200 H. P. Watertown tandem compound engines, direct connected to two 125 K. W. 2-phase Westinghouse A. C. generators. There is also a 25 H. P. standard Westinghouse engine, direct connected to a 15 K. W. Westinghouse D. C. generator for exciting the alternators. The switch board, a thin panel of Blue Vermont marble, is provided with the latest type of long scale, dead beat volt and ammeters polyphase wattmeter, ground detector and Lincoln synchronizer for paralleling the alternators. The station is also provided with a ten-ton traveling hand crane.

The condensers are located in the basement of the power station, the cooling water coming from a reservoir near the station, having a capacity of 500,000 gallons. All the power transformers are in the basement; they convert from 1100 volts, as generated by the machines, to 440 volts; the current is then distributed to 18 motors in as many different places about the campus. There are installed over two thousand eight hundred incandescent lamps, twenty-five arc lamps and about 250 H. P. in motors. The electric plant is Westinghouse throughout. The buildings are brick. Nearly all the buildings on the campus are heated and lighted from this plant. The total cost of this plant for generation of power, heat and light, and for its transmission to the buildings, is $112,000.

The views on the opposite page show the interiors of the boiler house and engine house above and below; and in the center, a view of the whole plant, looking west across the reservoir.

During the year 1900 a very excellently equipped experimental steam boiler of 100 H. P. capacity was donated to the University by Dr. Stillman W. Robinson, Emeritus Professor of Mechanical Engineering. This boiler, one of the most complete things of the kind ever erected, has been located in the Boiler House, but belongs to the Experimental Engineering Laboratory of the Department of Mechanical Engineering, and is under its supervision and control. This gift, for the special prosecution of experimental research, adds greatly to the opportunities offered to students by the already extensive power and electric plants.



ARCHITECTURAL MODELS AND PHOTOGRAPHS

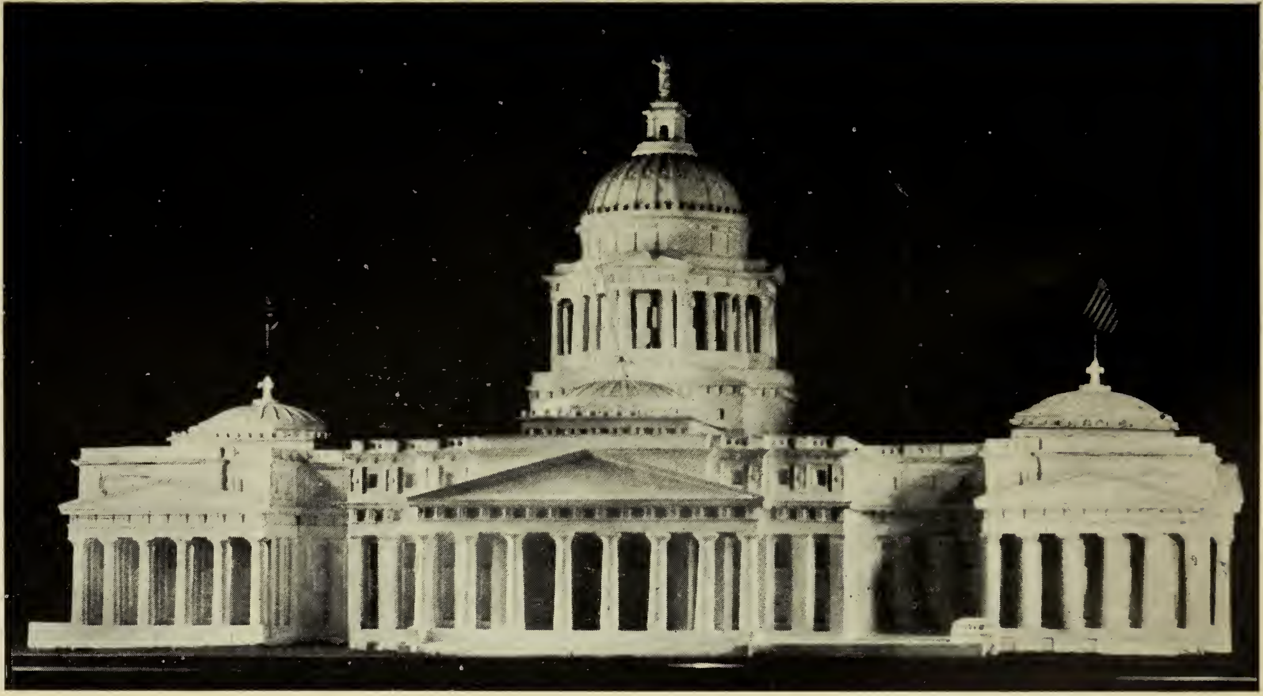
On the opposite page is illustrated one of several valuable models recently donated to the Department of Architecture by F. L. Packard, architect, of Columbus, Ohio. It represents his design for the enlargement and improvement of the present Ohio State Capitol Building. The design was accepted in 1896 by the Ohio State House Improvement Board but was not followed however in the recent addition to the capitol.

The model is a very fine one, in plaster, made to a scale of eight feet to the inch and measures about five feet in length. It is tastefully mounted in a case having three sides of glass and the fourth of red felt; the colored background throws the white model itself into striking relief. The pedestal is of such a height as to bring the building to the proper visual angle for presenting its architectural character to the observer. Six shaded electric lights throw an effective illumination on the structure during dark days and in the evening.

Illustrative material of this nature is a valuable feature of the equipment of the Department for showing the general appearance of buildings. The use of the three dimensions enables the student, particularly the beginner, to acquire a clearer mental conception of monumental structures than is often possible from the drawing or the photograph. His interest is also stimulated and his power over the subject is increased.

The illustration on page 40 shows part of another important equipment of the Department of Architecture, namely, the large collection of framed photographs. These represent both ancient and modern masterpieces in architecture. The views are 24″ x 30″ in size. Printed on each is the name of the structure, its geographical location, style of architecture and date of completion, thus adding to its educational value for both student and visitor. These pictures are placed on the walls of the room devoted to architectural designing, and, thus surrounding the students in their work, they produce an atmosphere of architecture which is quite inspiring.

Several periods in architectural history are shown by photographs of the recognized types of buildings of the various schools. By reference to these the students can readily compare the architectural character of buildings of different people and dates of erection, can trace the influence of a given type and can notice slight changes due to the local or national conditions. A better understanding is obtained of the many schools of architecture by such contrasts.



ARCHITECTURAL MODEL FOR STATE HOUSE

STUDENT ORGANIZATIONS

Religious

One of the most commendable organizations in the University is a branch of the International Young Men's Christian Association, organized in 1883. It has a house and a large membership. Prospective students are invited to write for information concerning board, rooms, employment, etc., to its General Secretary, 1610 Highland St., Columbus.

Literary

There are five literary societies in the University, three of which are open to young men. These are the Alcyone Literary Society, founded in 1874, the Horton Literary Society, founded in 1875 and the Athenian Literary Society, founded in 1896. Each of these societies has commodious and well furnished apartments in University Hall. They meet weekly, and their work gives a very desirable training in composition, public speaking, and parliamentary order. It is of special value *to students in the technical courses,* where the prescribed work includes but little training of this kind.

Technical

The Engineering Society, Chemical Association and Ceramic Association are organizations composed of instructors and students who meet to read and discuss questions of special interest. They aim to assist the students as early as possible in their course to begin the habit of accurate observation and description of engineering work where-ever it may be met; also to develop the habit of constant study of periodical engineering literature and to stimulate among all classes of engineers an intelligent appreciation of the great works of engineering of every age and of every kind.

Athletic Association

An important factor in the physical development of the students is the University Athletic Association. Its Athletic Board is composed of the Secretary of the Board of Trustees, three members from the Faculty, three from the Alumni, and four from the student body. This board has complete charge of all intercollegiate events and does all in its power to promote base-ball, foot-ball, tennis, basket ball, and track and other athletics.

Miscellaneous

There are numerous other organizations, membership in nearly all of which is open to all students. Their various objects are sufficiently indicated by the following titles: the Biological Club, the Political Science Club, the Sketch Club, the English Club, the Dramatic Club, the Glee Club, the Mandolin and Guitar Club, the Banjo Club, the Orchestra, the Male Quartet and the chorus.

Admission

The entrance examinations for 1902 will be held on Monday and Tuesday, June 16 and 17, and also September 22 and 23.

Applicants for admission to the College of Engineering must be at least 17 years of age. They must be provided with testimonials of good moral character from their last instructor. If they have previously attended any other college or university, they must present a letter of honorable dismissal therefrom. They must also give evidence of proficiency in the studies required for admission, either by *certificate* or *examination.*

CERTIFICATES

Certificates will be accepted in place of examination for those studies covered by them, when presented by graduates of such High Schools, Academies and Normal Schools in Ohio as have had their courses of study duly approved by the University.

In cases where the University faculty has specially designated any High School, on account of the high character of its work, as entitled to the privilege, students who have attended the school for at least two full years may present certificates for such entrance subjects as their work has covered, and will receive credit for the same.

Certificates, to be considered, must contain a detailed statement of the studies pursued, the text book used, the amount of work done in each study, the amount of time devoted to it and the applicant's rank or standing. Blank forms for such certificates will be furnished on application.

All certificates will be passed upon by officers of the College of Engineering, and where certificates are received prior to September 1, applicants will be notified by mail, of the subjects, if any, upon which their certificates will be accepted in lieu of examination. In those subjects in which credit is not allowed, the regular entrance examination must be passed. Certificates sent in later than September 1 will be given the same consideration as those received earlier, but the College will not undertake to reply by mail and delay in matriculation may result.

EXAMINATIONS

Applicants presenting no certificates, together with those whose certificates are not accepted in full satisfaction of the entrance requirements, must pass examination on the subjects set forth below, or in such part of the same as has been found unsatisfactory in their certificate.

Entrance examinations will be held on Monday and Tuesday immediately preceding Commencement day and on Monday and Tuesday immediately preceding the opening of the first term of each year (see Days and Dates, page 2). Examinations not taken in this period may be taken thereafter subject to the convenience of the Professor in charge.

REQUIREMENTS FOR ADMISSION TO THE FOUR-YEAR COURSES

Applicants to be admitted to full university standing must obtain credit for all the subjects given below before entrance. Applicants slightly in arrears may be admitted to Freshman work, subject to certain entrance conditions as set forth in page 111. For the information of such applicants, a weighting is attached to those subjects in the following list upon which entrance conditions are permitted. From these they may determine their claims to admission and the subjects in which to strengthen themselves before coming to the University.

1. Mathematics

Algebra. *Taylor's "Elements of Algebra" or an equivalent. Special attention should be given to the four fundamental operations, linear equations (single and in systems), factoring, highest common factor, lowest common multiple, fractions, and fractional equations, involution, evolution, surds and complex quantities; quadratic equations solved by factoring, by complete square, and by the *general formula;* irrational equations, simultaneous quadratic equations, higher equations solvable by factoring, ratio, proportion, progressions, theory of exponents, binominal theorem, and logarithms."

Geometry, Plane and Solid. Venable's, Wentworth's, White's or Wells'.

No deficiencies are permitted in Mathematics.

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* The student in an engineering course is badly crippled unless he can use his mithematics with confidence, accuracy, and rapidity. He should be able to perform any operation and solve any ordinary problem in the above list of subjects and determine the correctness of his results. This skill can only be acquired by practice.

The student intending to enter the Engineering College is advised to review his Algebra, making it a point of honor to solve every exercise in the text book used. If his High School work has been well done, and if he possesses the mathematical ability, together with that self-reliance and determination without which he cannot succeed as an engineer, he should be able to make this review with little or no assistance.

2. English

English Composition and Rhetoric. Each applicant will be tested as
English Classics. to his ability to write clear and correct English. The test will be the writing of several brief essays, of which one will be upon a subject drawn from the applicant's observation or experience, and the others upon topics requiring a knowledge of the following books, *or equivalents*: *Shakespeare's* Merchant of Venice, *Julius Caesar,* and *Macbeth;* Milton's *Lycidas, Comus, L'Allegro, and Il Penseroso;* Burke's *Conciliation with the Colonies;* Macauley's *Essays on Milton and Addison;* The Sir Roger de Coverly Papers in *The Spectator;* Goldsmith's *The Vicar of Wakefield;* Coleridge's *The Ancient Mariner;* Scott's *Ivanhoe;* Carlyle's *Essay on Burns;* Tennyson's *The Princess;* Lowell's *The Vision of Sir Launfal;* George Eliot's *Silas Marner.*

A weighting of two units is placed on English Composition and Rhetoric; and one unit on English classics.

3. Language

Latin. Pronunciation (the Roman method); Grammar (an exact knowledge of the inflections is essential); Cæsar, the first four books of the De Bello Gallico. **Or**

French. The whole subject of French Grammar. Applicants will be expected to read at sight easy French and to translate correctly into French, simple English sentences. **Or**

German. Joynes-Meissner's German Grammar, complete; Joynes' German Reader, complete; Hauff's Liechtenstein, Lessing's Minna von Barnhelm, Huss's Sessenheim and Buchheim, Goethe's Dichtung und Wahrheit.

A weighting of three units is placed on either of the three languages.

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*A knowledge of *one* language other than English is required for admission. French or German is preferred, but Latin will be accepted. Students preparing for an Engineering Course are advised to take as early an opportunity as possible to begin the study of a modern language. Those entering with French or German only will be required to pursue the same language during their first year.

4. History

United States History. Mc. Laughlin's History of the American Nation preferred. *A weighting of one unit is placed upon this subject.*

General History. Meyer's General History preferred. *A weighting of one unit is placed on this subject.*

Civil Government. Fiske or Thorpe preferred. *A weighting of one unit is placed on this subject.*

5. Science

Physics. Carhart and Chute, Gage, Avery or an equivalent. *A weighting of two units is placed on this subject.*

Physical Geography. Geikie's Elementary Lessons or its equivalent. *A weighting of one unit is placed on this subject.*

ENTRANCE CONDITIONS

No student will be admitted to the College of Engineering who is in arrears more than *two units*, none of which may be in mathematics, unless he is over 21 years of age. In that case, his deficiencies may include entrance language in addition to the above amount.

In the case of students who cannot meet these language requirements, the following arrangements will be made:—

1. Those entering with less than the required amount of Latin may make good their deficiency by an equivalent amount of work in French, German or Spanish. For this work they will receive no college credit.

2. Those over 21 years of age, entering with no training in language, may make good their deficiency by beginning either French, German or Spanish in the college. For this work they receive no college credit.

Removal of Conditions

All entrance conditions must be removed by the end of the second year, and by examination by the University officers. Certificates will not be received for entrance conditions after matriculation.

REQUIREMENTS FOR ADMISSION TO THE SHORT COURSES

Applicants must not be less than seventeen years of age, and unless they are over twenty-one years of age must pass an examination in Arithmetic and Geography, and must be able to write a business letter or a short theme correct in Grammar and Orthography; or bring High School or other certificates for these branches.

Applicants who are over twenty-one years of age are admitted without examination.

ADMISSION AS SPECIAL STUDENTS

Students who desire to pursue special lines of work in the University, and do not desire to become candidates for degrees, will be admitted on the following conditions:

1. The regular entrance requirements must be satisfied.

But applicants who are not less than eighteen years of age, after obtaining credit for elementary or "grade" work, and for such other subjects as may be necessary to qualify them for the classes that they wish to enter, may, on the presentation of satisfactory reasons, be admitted by the Faculty to any class in the College; provided, that if any student who has been admitted on these conditions afterwards becomes a candidate for a degree, he shall take the omitted entrance examinations at least one academic year before the degree is conferred.

2. On entering the College, students desiring to pursue special work are required to lay before the Faculty, for approval or modification, a written statement of the end they have in view, the studies proposed for the attainment of that end, and the probable period of attendance. Such students will be held as strictly to their accepted schemes of work as are the regular undergraduates to their courses of study.

3. *Permission to enter as special undergraduates will be refused to all who fail to give satisfactory evidence of definiteness of purpose and will be withdrawn whenever the conditions on which it was granted cease to exist.*

ADMISSION TO ADVANCED STANDING

1. Applicants who do not come from some other University or College must first obtain admission in the manner already described. They will then be examined on the undergraduate studies for which they ask credits.

2. Applicants who have completed at least one year's work in an approved College, and who bring explicit and official certificates describing their course of study and scholarship, and also letters of honorable dismission, will be admitted without examination, except such as may be necessary to determine what credit they are to receive here for work done in the College from which they come.

Attendance

Registration

All students are required to register and pay their term fees on or before the first day of each term (See Days and Dates, page 2) between the hours of 8:00 a. m. and 12 m., or between 1:00 and 4:00 p. m., central standard time.

Former students who fail to register as above will be charged one dollar in addition to the usual incidental fee, for the first day of delinquency, and fifty cents additional for each subsequent day.

No candidate for graduation will be permitted to register for the second term of his graduating year, except upon presentation to the Bursar of the President's certificate that his thesis subject has been announced and approved.

Amount of Work

No student is permitted to take less than fifteen credit hours a week of any sort of work, except by special permission, and no student will be permitted to take more than the regular work of the class to which he belongs, who has not passed all his work for the preceding term. A *credit hour* means one hour class room work in lecture, recitation or quiz, or two hours of laboratory work, once a week for one term.

Elective Studies

All elections of work in continuous studies, when once made, are understood to be made for the entire collegiate year.

The right is reserved to each professor to withdraw the offer of any elective study when it is not chosen by at least four persons.

Consultation

For consultation or information regarding work in any class or department, students will apply to the professor or instructor in charge.

For consultation or information in regard to their status as members of the College of Engineering, or for the filing of petitions, changes of course, changes of class cards, adjustment of schedules and similar needs, students will apply to the Secretary, who can be found every school day at his desk in the faculty room, University Hall, from 9 to 10 a. m.

On matters affecting their connection with the University, or in any way connected with the discipline of the institution, students will apply to the President of the University.

Examination and Standings

At the close of any term a student failing to pass in two-thirds of his work will be considered on *probation* for the next three terms; and a second similar failure incurred while thus on "probation" will forfeit his connection with the University.

The Convocation

An entire hour is devoted to a convocation at which the president presides. It is held in the Auditorium of University Hall at 10 o'clock on Wednesday of each week. In addition to devotional exercises, an address is delivered upon some suitable topic. During this hour the libraries and laboratories are closed and no other University exercises occur. It is expected that the Faculty and students will attend. The public is always welcome at the Convocation.

Graduation

Thesis

As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a sepcial study. The subject of this study must lie within the field of the degree sought. The subject must be filed with the President of the University (dependent upon the approval of the head of the Department), on the official blank provided for the purpose, not later than December 15 of the University year in which the degree is sought. (See also Registration, page 113.) The completed thesis must be submitted to the head of the department concerned not later than the second Saturday before Commencement Day.

The accepted thesis,— on standard paper, as per sample in the President's office, typewritten or printed, neatly bound in black cloth, gilt-lettered on first cover with the thesis title, name of author, degree sought and year of graduation,—must be filed not later than the Friday preceding Commencement Day.

Degrees

The degree of Civil Engineer in Architecture is conferred on those who have completed the course in Architecture; that of Engineer of Mines in Ceramics on those who have completed the Course in Ceramics; that of Bachelor of Science in Chemical Engineering on those who have completed the Course in Chemical Engineering; that of Civil Engineer on those who have completed the Course in Civil Engineering; that of Mechanical Engineer in Electrical Engineering on those who have completed the Course in Electrical Engineering; that of Bachelor of Science in Industrial Arts on those who have completed the Course in Industrial Arts, or the Course in Manual Training; that of Mechanical Engineer on those who have completed the Course in Mechanical Engineering; that of Engineer of Mines on those who have completed the Course in Mining Engineering.

Except by unanimous consent of the Faculty, no candidate for graduation will be recommended for a degree whose record is not in all respects complete by the Friday evening previous to the Commencement Day on which he seeks the degree.

Expenses

Fees

Each student is required to pay an incidental fee of eighteen dollars a year. and the usual fees for the expense of laboratory work. Tuition is free.

Laboratory Fees. — Students in the laboratories and shops are required to pay fees to cover, in part, the cost of the material consumed, and the deterioration of the expensive instruments used by them. The fees charged per term in the laboratories mentioned below are as follows:

Ceramics, 9, 10 11	$5 00
Drawing, 7	2 00
Electrical Engineering Laboratory, 3 hrs. or less, $5; over 3 hrs.	7 00
Gymnasium locker (if desired)	1 00
Mechanical Engineering, 12, 14, 15, 17, 24, 25, 27, 28, 29, 30 or 35	5 00
Physics Laboratory, 3 hrs or less, $5; over 3 hrs	7 00
Shop Work, 4 hrs. or less, $5; over 4 hours	7 00

In the laboratories of the Departments of Chemistry, Ceramics and Metallurgy, each student is required at the beginning of each term to pay a fixed charge of one dollar and fifty cents for gas and water. He is also required to buy his own supplies, which may be obtained at the storeroom in Chemical Hall. With reasonable care, this expense need not exceed $5.00 per term.

All term dues must be paid at the opening of each term as a condition of admission to classes.

A fee of five dollars to cover expense of graduation, diplomas, etc., is required of each person receiving one of the ordinary degrees from the University, and this fee must be paid before the degree is conferred.

Note — There are in contemplation certain changes in regard to the expenses. These include abolishing laboratory and shop fees as such and raising the incidental fee to $8 a term, $24 a year. Where it can be readily arranged, the student will pay for material used by him.

Other Expenses

There are two dormitories on the University grounds for the use of students. Each occupant is charged by the University a rent of one dollar and fifty cents a term.

The South Dormitory affords unfurnished rooms to such students as desire to board themselves, and thus to reduce their expenses to a minimum. The expense of living in this way falls below two dollars per week. Applications for room should be made to the President of the University.

The North Dormitory will accommodate more than sixty students. Board, furnished rooms, fuel, light and washing are, at present prices, supplied for about three dollars and twenty-five cents a week. Students will be admitted on special recommendation to the President of the University.

Boarding clubs are also formed in the neighborhood of the University. Furnished rooms are rented at seventy-five cents to one dollar a week for each student, and the cost of board is two dollars to three dollars a week.

Board, with furnished rooms, can be obtained in private families within convenient distances of the University, at rates varying from four dollars to five dollars a week. The ruling rate may be taken as four dollars.

The uniform with which the members of the battalion are required to provide themselves costs about fourteen dollars. It is quiet in pattern and is designed to be worn daily in place of civilian dress.

The expense of a student in this College for a year may be estimated as follows, excluding clothing (except uniform) and traveling expenses:

	Low.	Average.	High.
Incidental fees	$18 00	$18 00	$18 00
Laboratory fees	15 00	15 00	54 00
Books and stationery	15 00	25 00	40 00
Room	4 50	37 00	75 00
Furniture	10 00	......	......
Board	70 00	110 00	150 00
Uniform	14 00	14 00	14 00
	$146 50	$219 00	$351 00

The second and third estimates for room include light, fuel and care. The third estimate is for a room occupied by a single student. The requirements for laboratory fees and books depend upon the course of study pursued.

Self Support

There is a large amount of work upon the University farm and in the shops and laboratories assigned to students, preference being given to those who are studying Agriculture or one of the Engineering Courses. But the University cannot promise work to all applicants. Many students find work in private families, in offices, and in various occupations, by means of which they defray at least a portion of their expenses. A person of ability and energy, who is master of a trade, or who can do good work of any kind, can generally find remunerative employment. It has seldom been known that any student of ordinary energy and industry was obliged to leave the University because of a lack of money for necessary expenses, after having been sixty days on the ground — or long enough to inform himself as to the opportunities for securing employment. An employment bureau is maintained at the University, where the names of those seeking work and of those desiring workers are recorded.

Enrollment

APRIL 1st, 1902

Students in Four Year Courses Leading to Degrees . .	503
Students in Short Courses, not Leading to Degrees . .	53
Special Students	29
Total	585

CLASSIFICATION BY COURSES

Name of Course Pursued	4th Year	3rd Year	2nd Year	1st Year	2nd Year, Short	1st Year, Short	Special	Total
Unclassified	....	....	......	216	....	....	.	216
Architecture	....	3	5	Unclassified	..	...	....	8
Ceramics.	3	3	4		5	12	6	33
Chemical Engineering	5	7	7		....	...	2	21
Civil Engineering	17	20	43		....	...	...	80
Electrical Engineering	9	11	44		...	...	...	64
Industrial Arts	...	..	1		6	17	.	24
Mechanical Engineering.	16	27	27		....	....	1	71
Mining Engineering.	7	10	18		2	11	1	49
Special, Unclassified	...	....	....	....	...	....	19	19
Total.	57	81	149	216	13	40	29	585

Note: — For list of names, consult the General Catalogue of the University, which will be sent on application.

Graduates

CIVIL ENGINEERS (C. E.)	95
MECHANICAL ENGINEERS (M. E.)	62
MINING ENGINEERS (E. M.)	51
ELECTRICAL ENGINEERS (M. E. in E. E.)	102
CHEMISTRY (B. Sc. in Chemistry)	12
INDUSTRIAL ARTS (B. Sc. in Ind. Arts)	2
CERAMICS (E. M. in Ceramics)	1
MASTER OF SCIENCE, CONFERRED BY COLLEGE OF ENGINEERING	2
TOTAL DEGREES CONFERRED	327
NAMES COUNTED TWICE	8
TOTAL NUMBER OF GRADUATES	319

DIRECTORY OF GRADUATES

The faculty of the College of Engineering are anxious to place a copy of each annual catalogue in the hands of their graduates. They will esteem it a favor if any alumnus who changes his residence will notify the secretary of the College of his new address and occupation. They will also be grateful for any information from any source, that may assist in making or keeping the Directory of the Alumni complete and correct.

A

Ackerman, Eli Osborn, 1884, C. E. Station "B," Columbus, Ohio.	Engineer Maintenance of Way, Columbus Railway Company.
Ackerman, Fremont, 1883, C. E. Los Angeles, California.	Civil Engineer.
Aldrich. Edgar S., 1897, E. E. Snohomish, Wash.	Manager Snohomish Electric Light and Power Co.
Alexander, Charles P., 1896, E. E. Canton, Ohio.	District Manager, Northwestern Mutual Life Insurance Company.
Alexander, St. Clair, 1893, E. E. Kansas City, Mo.	Stock Yards.
Alsdorf, Frederick C., 1892, E.M. Central City, Colorado.	Superintendent, Mt. Wilson Gold & Silver Mining Company.
Alsdorf, Percy Reed, 1896, E. M. Central City, Colorado.	Standard Assay Office.
Arnold, Edwin Ebert, 1898, M. E. East Pittsburg, Pa.	Engineer, Westinghouse Machine Company.
Atkinson, Warren, 1899, M. E. Brooklyn, New York.	Maintenance Dept. New York Telephone Company.
Auld, James A., 1897, E. E. Columbus, Ohio.	With D. S. Auld.

B

Barcus, Miner, 1897, E. E. Schenectady, N. Y.	Assistant, Engineering Dept., General Electric Company.

Barlow, Moses Henry, 1901, C. E. Dayton, Tenn.	Civil Engineer with Dayton Coal and Iron Co.
Barnaby, Charles L., 1898, C. E. Cincinnati, Ohio.	Assistant on Engineer Corps, Cincinnati Division, P., C., C. & St. L. Ry.
Barrows, Harry H., 1898, C. E. Birmingham, Ala.	Assistant Engineer, Alabama Great Southern Railway.
*Bartholomew, Clyde S., 1896, C. E.	Died June 23, 1900.
Beach, David Price, 1895, C. E. Cincinnati, Ohio.	Assistant Engineer Maintainance of Way, P., C., C. & St. L. Ry.
Beck, Arthur Andrew, 1893, C. E. Columbus, Ohio.	Deputy County Surveyor.
Belden, Sanford Bonner, 1895, E.M. Pittsburgh, Pa.	Manager Pittsburg Office, Jeffrey Manufacturing Company.
Biebel, Herman M., 1896, E. E. Chicago, Illinois.	In Engineering Department, Western Electric Company.
Bischoff, John Wallace, 1899, E.M. Robertsdale, Pa.	Engineer, Rockhill Iron and Coal Co
Bissing, William, 1893, E. E. Washington, D. C.	Examiner, U. S. Patent Office.
Blackburn, Frank H, 1896, E. E. Fostoria, Ohio.	Superintendent, Fostoria Incandescent Lamp Company.
Bleininger, Albert Victor, 1901, B. Sc. (Chem.) Columbus, Ohio.	Chemistry Instructor in Ceramics, Ohio State University.
Bloom, J. George, 1889, C. E. New Castle, Pa.	Division Engineer, New Castle Division, B. & O. R. R.
Bowden, Harry William, 1900, C.E. 579 E. Division St., Chicago, Ill.	In Engineering Department, North Works, Illinois Steel Co.

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* Dead.

Boehme, Adolph J., 1901, M. E..... Youngstown, Ohio.	Engineer with the Youngstown Iron Sheet and Tube Co.
Bower, Jerome G., 1897, M. E....... Chicago, Ill.	Mechanical Salesman, Pressed Steel Car Co., Chicago.
Bott, George R., 1901, M. E......... Miller School, Va.	Instructor of Drawing, Miller Manual Labor School.
Bradford, Joseph Nelson, 1883, M.E. Columbus, Ohio.	Professor of Architecture and Drawing, Ohio State University.
Brophy, James Francis, 1899, E. M. Coopers, W. Va.	Engineer for Cooper Interests in Mercer and McDowell Counties.
Brown, Frederick W., 1888, E. M... Portland, Colorado.	Engineer of Construction for Colorado Portland Cement Co.
Brown, John Quincy, 1898, M. E.. Oakland, Cal.	Assistant General Manager and Engineer,Oakland Transit Co.
Brown, Newton H., 1893, E. E..... Chattanooga, Tenn.	General Manager, Rapid Transit Company.
Brumley, Daniel Joseph, 1895, C.E. Elizabethtown, Kentucky.	Road Master, 1st Division, Louisville & Nashville R. R.
Bruning, Henry D., 1896, C. E.... Logansport, Indiana.	Assistant Engineer, P., C., C. & St. L. R. R.
Buchenberg, Alvin E., 1900, E. E.. Holgate, Ohio.	Electrical Engineer.
Buckman, Arthur L., 1897, E. E... Toledo, Ohio.	Wire Chief, Central Union Telephone Company.
Burns, James Ferguson, 1891, C. E. Hopkinsville, Kentucky.	Assistant Engineer, Louisville & Nashville R. R.
Bygate, Harry G., 1899, M. E...... Bellaire, Ohio.	Draftsman, Bellaire Works, National Steel Co.

C

Calkins, George Herbert, 1895, E.E. Schenectady, N. Y.	Production Clerk, General Electric Company.
Cameron, Harry E., 1901, C. E..... Rankin, Pa.	Structural Draughtsman, McClintic Marshall Construction Co.
Capron, Marshall F., 1888, M.E... Detroit, Michigan.	Chief Mechanical Engineer, Seamless Steel Tube Co.
Carr, Hugh Stanley, 1896, E. E... Cleveland, Ohio.	Electrical Engineer.
Carroll, Patrick Henry, 1894, E.M. Herrin, Illinois.	Superintendent, Big Muddy Coal & Iron Co.
Carson, Samuel King, 1895, E. E... Manila, P. I.	Acting Assistant Surgeon, U. S. A.
*Catlin, Homer Clark, 1896, C. E.	Died March 10, 1902.
Cavanaugh, Andrew F., 1900, M. E. Dayton, Ohio.	Draughtsman, Stillwell-Bierce & Smith-Vaile Co.
Cellarius, Frederick J., 1888, C.E. Dayton, Ohio.	Assistant City Engineer.
Chappell, Walter Evans, 1898, E.E. 46 Ruo de Quelhas, Lisbon, Portugal.	Engineer, Macartney, McElroy & Co., Ltd., London, England.
Cilley, Raymond, 1896, M. E....... Stamford, Conn.	Chief Draughtsman, Graham-Fox Motor Co.
Clarke, C. J., 1899, C. E........... Columbus, Ohio.	Draftsman, Scioto Valley Traction Co.
Coddington, Edward F., 1896, C. E. M. Sc., 1897; 1902, Ph. D., University of Berlin. Berlin, Germany.	
Cole, George Nathan, 1891, E. E... 265 Broadway, New York, N. Y.	Contractor Railroad Supplies.

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* Dead.

Collins, Curtis, 1895, E. E......... San Juan, Puerto Rico.	Electrical Engineer for S. A. Luz Electrica and Rio Plata Electric Co.
Connell, William A., 1886, E.M. Kansas City, Missouri.	Secretary, Virginia Manganese Iron and Coal Company.
Conway, Hugh L., 1896, C. E...... Cincinnati, Ohio.	Transitman, New Water Works.
Cope, Albert N., 1897, E. E........ Columbus, Ohio.	Assistant Engineer of Construction, Columbus Railway Co.
Cosley, Harvey H., 1901, C. E...... Chicago, Ill.	With Illinois Steel Co.
Covell, Vernon Royce, 1895, C. E. Pittsburgh, Pa.	County Engineer's Assistant.
Crable, Arthur, 1901, C. E......... Zanesville, Ohio.	Civil Engineer with B. & O. R. R. Company.
Cunningham, E. W., 1894, C. E... Pittsburgh, Pa.	Bridge Draughtsman, Keystone Branch American Bridge Co.
Curtis, Leigh Goodrich, 1899, C. E. Garrett, Ind.	Assistant Division Engineer on Chicago Division B. & O. R. R.

D

Damron, Carson W., 1897, M. E... Fairmont, W. Va.	Chief Draftsman, Wagner-Palmros Mfg. Co.
Davis, Charles William, 1894, E.M. Colorado Springs, Col., care J. McK. Ferriday & Co.	General Mining Business.
Davis, Oscar Allen, 1897, E. E..... Alliance, Ohio.	Draftsman, Morgan Engineering Company.
Deahl, Walter Smith, 1896, C. E. Pittsburgh, Pa.	Draughtsman, Bridge Department, Bureau of Engineering and Construction.
DeLoffre, Andre, 1896, E. E....... London, E. C., England.	Electrical Engineer for General Electric Co.

DeWolf, R. D., 1901, E. E. Marietta, Ga.	In private business.
Denny, Charles W., 1901, E. E. New York, N. Y.	With Sawyer Man. Electric Co.
Diemer, Hugo, 1896, E. E. Lawrence, Kansas.	Associate Professor Mechanical Engineering, University of Kansas.
Dill, Raymond, 1901, E. E. Pittsburgh, Pa.	Special Apprentice Westinghouse Electric and Mnfg. Co.
Donham, Maurice D., 1896, M. E. Warren, Pa.	Secretary and General Manager, Jacobson Machine Mfg. Co.
Drummond, William G., 1900, M.E. Columbus, Ohio.	With Columbus Forge and Iron Company.
Dun, John J., 1883, E. M. Columbus, Ohio.	Consulting Engineer.
Dunlap, Thaddeus Cox, 1895, E.E. Columbus, Ohio.	Manager Columbus Pneumatic Tool Co.
Dunlop, Robert Rowse, 1900, E. E. Schenectady, N. Y.	In Testing Department, General Electric Co.
Dunnick, Edward, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.

E

Erskine, James H., 1886, E.M.,M.D. Albany, Oregon.	Physician and Surgeon.
Estep, Frank Leslie, 1898, E. E. Bridgeport, Conn.	Foreman Copper Rolling Mill, Bridgeport Brass Co.
Evans, Peter Platter, 1892, C. E. Osborn Building, Cleveland, Ohio.	Contracting Engineer.
Eysenbach, Ernest E., 1896, E. M. Columbus, Ohio.	Superintendent, Columbus Gas Co.

F

Feicht, Russell S., 1890, E. E. Pittsburgh, Pa.	In Engineering Department, Westinghouse Electric & Manufacturing Company.
Fergus, Guy Carlton, 1898, E. E. Zanesville, Ohio.	Partner, Zanesville Electric Co.
Fickes, Walter Morgan, 1900, E.M. (Ceramics). Carnegie, Pa.	Manager of the Rosslyn Brick Co.
Fish, Fred Alan, 1898, E. E. Columbus, Ohio.	Assistant Professor of Electrical Engineering, Ohio State University.
Floto, Julius, 1889, E. M. Anaconda, Montana.	With Anaconda Copper Mining Co.
Flynn, Benjamin H., 1898, C. E. Columbus, Ohio.	Engineer to the Ohio State Board of Health.
Flynn, Harry Franklin, 1892, C.E. Washington, D. C.	Assistant U. S. Coast and Geodetic Survey.
Ford, Nile Otis, 1901, E. M.; 1897, A. B.; 1900, M. S., W. & J. Hill City, South Dakota.	Engineer for the Lakota Gold Mining and Reduction Co.
Foster, Frank M., 1894, E. E. Cincinnati, Ohio.	Secretary and Treasurer, The John N. Poage Manufacturing Co.
Fowler, Harry R., 1894, E. E. Toledo, Ohio.	Electrical Engineering and Contracting.
Fox, John Herbert, 1897, M. E. Cleveland, Ohio.	Mechanical Engineer in charge of Engine Dept., The Brown Hoisting Machinery Company.
Frame, Rollo S., 1901, C. E. Logansport, Ind.	Assistant on Engineer Corps, Logansport Div., Penn. Lines.
Frankenburg, John T., 1899, E. E. Columbus, Ohio.	Manager Ohio Publishing Co.
Fravel, George B., 1888, M. E., Columbus, Ohio.	Assistant Master Mechanic, Pennsylvania Lines.

Frayer, Lee Ambrose, 1896, M. E. Columbus, Ohio.	Frayer & Miller, Motor Cycles.
Frechtling, Arthur, 1901, M. E. Cheyenne, Wyoming.	Special Apprentice Union Pacific R. R.
Freeman, Stanton S., 1898, E. M. Parryville, Pa.	Superintendent, Carbon Iron & Steel Company.
French, Thomas Ewing, 1895, M.E. Columbus, Ohio.	Associate Professor of Architecture and Drawing, Ohio State University.
Frost, George Winfield, 1900, M. E. Columbus, Ohio.	Assistant in Mechanical Engineering, Ohio State University.

G

Gallen, William F., 1897, M. E. Columbus, Ohio.	Case Manufacturing Company.
Gamper, Herman, 1899, M. E. Xenia, Ohio.	Supt. Mechanical and Electrical Dept., O. S. & S. O. Home.
Garber, John Murray, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.
Gee, Eugene C., 1897, E. E. Phoenix, Arizona.	Special, Bell Telephone Co.
Gehrkens, Edward F., 1894, E. E. Schenectady, N. Y.	With General Electric Company.
Given, James Byron, 1896, E. E. Chicago, Illinois.	With Western Electric Company.
Goddard, Loring Hapgood, 1892, C.E. Manara, Ohio.	Farmer.
Goodell, Ralph Spencer, 1892, C. E. Mt. Vernon, Ohio.	Principal Assistant Engineer, Mt. Vernon Bridge Works.
Graham, Emery Eugene, 1898, E. E. Cleveland, Ohio.	Draughtsman, Wellman-Seaver-Morgan Engineering Co.

Grate, Charles Artemus, 1898, M.E. Canton, Ohio.	With the Aultman Company.
Green, Jerome Joseph, 1893, E. E. Notre Dame, Indiana.	Professor of Physics and Electrical Engineering, University of Notre Dame.
Green, Joseph Farist, 1899, E. E. Moline, Illinois.	Electrical Engineer, M. E. Co.
Gregory, Hiram D., 1880, E. M. Covington, Ky.	Attorney-at-Law.
Griffin, Mark H., 1897, E. E. Toledo, Ohio.	Electrical Engineer for the Toledo and Indiana Railway Co.
Groves, John Wesley, 1898, C. E. Boomer, W. Va.	Mining Engineer, Boomer Coal Co.

H

Haas, F., 1895, C. E.; 1896, E. M. Fairmount, W. Va.	Chemist, Fairmount Coal Co.
Hale, Frederick James, 1898, M. E.; 1900, M. Sc. Pittsburgh, Pa.	Westinghouse Machine Co., Gas Engine Dept.
Hall, Harry R., 1889, E. M. Sault Ste Marie, Ontario, Canada.	Supt. Blast Furnaces, The Lake Superior Power Co.
Hance, Harry T., 1901, B. Sc., (Chem.) Columbus, Ohio.	Fellow in Chemistry, Ohio State University.
Harkins, Robert Rusk, 1900, M. E. La Fayette, Ind.	Instructor in Mechanical Engineering, Purdue University.
Harrison, William H., 1885, C. E. Oroya, Peru.	Engineer Scierro De Pasco Ry.
Hartwell, Arthur, 1888, M. E. Pittsburgh, Pa.	Sales Manager, Westinghouse Electric & Mfg. Co.
Hartwick, Louis M., 1897, M. E. Pueblo, Colorado.	Master Mechanic of Blast Furnace.
Hassler, Robert Hanich, 1892, E.E. Indianapolis, Ind.	Engineer, International Motor Car Co.

Hayman, William C., 1900, E. E. Schenectady, N. Y.	In Testing Dept., General Electric Co.
Hayward, George E., 1893, C. E. Mankato, Minn.	Roadmaster, C. & St. P., M. & O. Ry.
Hazlett, Robert Jr., 1887, C. E. Wheeling, West Va.	Consulting Civil Engineer, County Engineer and Chief Engineer Pan Handle Traction Co.
Hebble, Charles Roy, 1896, E. E. Xenia, Ohio.	General Insurance Agency.
Heller, Albert Henry, 1890, C. E. Columbus, Ohio.	Professor of Bridge Engineering, Ohio State University.
Henderson, Adelbert A., 1898, C.E. Pittsburg, Pa.	Transitman, County Engineer.
Henretta, Charles M., 1896, E. M. Fernie, B. C.	Mining Engineer, Canadian Pacific Railway.
Hertner, John Henry, 1899, E. E. Cleveland, Ohio.	Hertner Electric Company.
Hewitt, Stafford R., 1898, E. E. Central City, Kentucky.	Engineer for Central Coal and Iron Co.
Hine, Lucius A., 1888, E. M. Chicago, Illinois.	President and Treasurer, Hine-Watt Manufacturing Co.
Hipple, John Merton, 1898, E. E. Pittsburgh, Pa.	Engineer, Westinghouse Electric and Manufacturing Co.
Hirsch, Gustav, 1897, E. E. Detroit, Michigan.	General Superintendent, People's Telephone Co.
Homan, Frank, 1895, C. E. Chilhowee, Tenn.	Superintendent Southern Slate Co.
Howald, Ferdinand, 1878, B. Sc.; 1881, E. M. Rush Run, Fayette Co., W. Va.	Coal Operator.
Howells, E. S., 1884, E. M. Blocton, Alabama.	General Manager Howells & Jones (coal firm).

Howells, Thomas J., 1897, E. M. Bluefield, W. Va.	Chemist in Pocahontas coal field for National Steel Co.
Hunt, William F., 1887, M. E.; 1895, LL D.; 1896, LL. M. (Univ. of Minn.) St. Paul, Minn.	Attorney-at-Law.
Hunter, Madone C., 1900, E. E. Columbus, Ohio.	Electrical Engineer, Kilbourne & Jacobs Mfg. Co.
Huntington, Arthur, 1899, M. E. Evanston, Illinois.	Superintendent, Evanston Electric Illuminating Co.
Hyle, Charles A., 1896, E. E. San Francisco, Cal.	Observer U. S. Weather Bureau.

I

Ireland, Guy L., 1895, M. E. Pittsburgh, Pa.	Western Representative Harbison, Walker Co.
Irvin, Chadwick H., 1897, M. E. Sharon, Pa.	Draughtsman, Sharon Steel Co.

J

Jenkins, William G., 1893, C. E. Bellefontaine, Ohio.	Draughtsman, The Bellefontaine Bridge & Iron Co.
Jenkins, Willis H., 1894, C. E. Carnegie, Pa.	Transitman, Pennsylvania Lines, West of Pittsburg.
Jennings, Levi E., 1897, E. E. Dayton, Ohio.	With R. E. Kline, Consulting Engineer.
Johnson, Charles W., 1896, E. E. Cincinnati, Ohio.	Chief Draughtsman, Bullock Electric Manufacturing Company.
Johnson, Earl Stinson, 1900, E. E. Schenectady, N. Y.	In Testing Department, General Electric Company.
Johnson, Herbert L., 1892, E. E. Troy, Ohio.	Manufacturer of Electric Machinery.

Johnston, George E., 1892, C. E... Louisville, Kentucky.	Assistant Engineer, L. & N. R. R. Co.
*Jones, A. A., 1886, C. E..........	Died May, 1894.
Jones, Arthur James, 1898, E. E... E. Pittsburgh, Pa.	Westinghouse Electric & Manufacturing Company.
Jones, Alexander H., 1895, E. E...	
Jones, Pearl N., 1892, E. E......... Wilkinsburg, Pa.	Engineer and Salesman, Westinghouse Electric & Mfg. Co.
Jones, Smilie, 1894, E. M......... Prescott, A. T.	Superintendent, Empire Gold Mining & Milling Company.
Judd, H., 1897, M. E.; 1899, M. Sc.. Columbus, Ohio.	Assistant Professor in Experimental Engineering, Ohio State University.

K

Kanmacher, Samuel H., 1900, E. E. Schenectady, N. Y.	In Testing Department, General Electric Co.
Keffer, Fredrick, 1882, E. M....... Anaconda, British Columbia.	General Manager, the British Columbia Copper Co., Ltd.
Kemmler, Edward A., 1888, C. E... Columbus, Ohio.	Assistant City Engineer.
Kerr, Samuel Thompson, 1894, E.E. Martins Ferry, Ohio.	Superintendent Municipal Electric Light Plant.
Kester, Fredrick Edward, 1895, E.E. Columbus, Ohio.	Assistant Professor of Physics, Ohio State University.
Kettler, Frank C., 1901, C. E...... Chicago, Illinois.	In North Works, Illinois Steel Co.
Kiesewetter, L. F., 1891, C. E.; 1892, A. B.; 1893, A. M. (Harvard). Columbus, Ohio.	Cashier, The Ohio National Bank.

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* Dead.

King, Herbert S., 1901, C. E....... Belington, W. Va.	Engineer with Maryland Smokeless Coal Co.
Kline, Charles H., 1897, E.E...... Dayton, Ohio.	Civil Engineer, with R. C. Kline, Consulting Engineer
Knecht, Arthur E., 1898, M. E.... Cincinnati, Ohio.	Mechanical Engineer, Cincinnati Screw and Tap Co.
Knight, William Abner, 1900, M.E. Columbus, Ohio.	Assistant Professor of Machine-Shop Practice, Ohio State University.
Knox, Frank S., Jr., 1900, E. M... Grays Flat, West Virginia.	Resident Engineer, Federal Coal and Coke Co.
Krumm, Louis Ralph, 1898, E. E.. Columbus, Ohio.	Engineer, Columbus Citizens' Telephone Company.
Kuhn, Vallie Howard, 1896, E.E. Etna, Ohio.	

L

Lamb, Whitney Earl, 1900, E. E. Schenectady, N. Y.	In Testing Department, General Electric Company.
Lamme, Benjamin G., 1888, M. E... Pittsburgh, Pa.	Assistant Chief Engineer, Westinghouse Electrical & Manufacturing Company.
Lamme, Bertha A., 1893, E. E..... Pittsburgh, Pa.	With Westinghouse Electric & Manufacturing Company.
Large, Joseph H., 1890, C. E....... Massillon, Ohio.	Draughtsman, Massillon Bridge Co
Lee, Corliss Edgar, 1900, E. E..... Schenectady, N. Y.	With General Electric Co.
Lee, Robert M., 1897, M. E......... Schenectady, N. Y.	Draughtsman, General Electric Co.
Lesh, John Howard, 1901, M. E.... Cleveland, Ohio.	Engineering Department, Cleveland Electric Co.

Levering, Orpheus D., 1893, M. E. Columbus, Ohio.	Foreman of Tool Room, Columbus Machine Company.
Lincoln, Paul M., 1892, E. E. Pittsburgh, Pa.	Electrical Engineer, Westinghouse Electric and Manufacturing Co.
*Lindo, William C., 1896, C. E.	Died, 1900.
Linebaugh, Jesse Joseph, 1899, E.E. Schenectady, N. Y.	Electrical Engineer, Testing Department, General Electric Co.
Linville, C. P., 1900, B. Sc. (Chem.). Columbus, Ohio.	Fellow in Chemistry, Ohio State University.
Logan, Lavallette L., 1896, E. M. Robertsdale, Pa.	General Manager, Rockhill Iron & Coal Co.
Lott, Charles Milford, 1895, E. E. Hicksville, Ohio.	Proprietor and Superintendent of Hicksville Electric Light Plant.
Lovejoy, Ellis, 1885, E. M. Union Furnace, Ohio.	Superintendent, Columbus Brick & Terra Cotta Company.
Lyon, Arthur H., 1900, M. E. Bucyrus, Ohio.	Chief Draughtsman, New York Blower Co.

M

Manley, Rush Emmett, 1894, E. E. Columbus, Ohio.	Chief Inspector, Central Union Telephone Co.
Markworth, Otto S., 1901, B. Sc. (Chem.). Pittsburgh, Pa.	Local Inspector, New York Rapid Transit Board of Commissioners.
Marquard, Frank F., 1896, C. E. Sharon, Pa.	Chief Chemist, The Sharon Steel Company.
Marshall, Willard B., 1900, E. E. Chicago, Illinois.	
Martin, George, 1897, E. E. Youngstown, Ohio.	Wire Chief, Central Union Telephone Co.

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* Dead.

Martin, John D., 1901, M. E....... Dennison, Ohio.	Special apprentice, P., C., C. & St. L. Ry. Shops.
Martin, Percy, 1892, E. E......... Coventry, England.	General Manager, Daimler Motor Company.
Marvin, Charles F., 1883, M. E.... Washington, D. C.	Professor of Meteorology, in Charge Instrument Division, U. S. Weather Bureau.
Masters, George Albert, 1886, C. E. Topeka, Kansas.	Assistant Bridge Engineer, A. T. & S. F. Ry System.
Matson, William Edgar, 1896, E.E. Lynn, Massachusetts.	In Production Department, General Electric Company.
McAllen, William J., 1894, C. E... Chicago, Illinois.	Civil Engineer, Structural Department, Illinois Steel Company.
McCarter, Robert D., Jr., 1895, E.E. 110 Cannon St., London, E. C., England.	Electrical Engineer, General Electric Company of New York.
McCormick, John H., 1880, M. E... Columbus, Ohio.	Mechanical Engineer.
McCormick, William F., 1896, M.E. Chicago, Illinois.	Draughtsman, Chicago & Northwestern R. R.
McGrew, John A., 1895, C. E....... Logansport, Indiana.	Engineer, M. of W. Pennsylvania Company, Logansport, Division.
McGuffey, Francis H., 1894, E. E. Columbus, Ohio.	Clerk in Ry. Mail Service.
McIntire, Alfred Heber, 1898, E.E.; 1900, M. E. Schenectady, N. Y.	In Testing Department, General Electric Company.
McNarry, George B., Jr., 1896, E. E. Toledo, Ohio.	Traveling Salesman, F. Bissell & Company.
Melick, Neal A., 1900, C. E........ New York, N. Y.	Draughtsman, Chief Engineer's Office, N. Y. C. & H. R. R. R.
Menough, Arthur G., 1894, E. M... Wellsville, Ohio.	Assayer and Chemist.

Mercer, Frank Emmett, 1896, E. E. San Francisco, Cal.	With Risdon Iron and Locomotive Works.
Mershon, Ralph D., 1890, M. E. New York City.	Consulting Engineer.
Miller, Frank Case, 1893, C. E. Springfield, Ill.	Engineer Maintainance of Way, Middle Division, Chicago & Alton R. R.
Miller, Henry F., 1889, M. E. 345 E. State St., Columbus, Ohio.	
Miller, Ralph C., 1901, C. E. Pittsburgh, Pa.	In Maintainance of Way Department, Pittsburgh Division, P., C., C. & St. L. Ry.
Morris, Clyde Tucker, 1898, C. E. Seattle, Wash.	Office Engineer, Puget Sound Bridge & Dredging Co.
Morris, Robert Hamilton, 1901, E. M. Modoc, Ohio.	Engineer Modoc Coal and Mining Co.
Morrison, Robert O., 1893, C. E. New Castle, Pa.	Assistant on Engineer Corps, Erie & Ashtabula Division of Pennsylvania Lines West of Pittsburg.
Morton, George L., 1884, M. E., Washington, D. C.	Principal Examiner, U. S. Patent Office.
Munn, Mortimer Adam, 1894, C. E. Cleveland, Ohio.	Civil Engineer, with E. P. Roberts & Company.
Myers, Albert B., 1900, E. M. San Luis Potosi, Mexico.	Assistant Engineer and Draughtsman, Compania Metalurgica Mexicana.
Myers, Ord, 1895, E. E. New York City.	Electrician, Metropolitan Street Railway Company.
Myers, Roy V., 1893, C. E. Dayton, Tennessee.	Superintendent Mines, Dayton Coal and Iron Co. Ltd.
Myers, Uriah H., 1887, E. M. Pittsburgh, Pa.	Printer and Stationer.

N

Nagel, William G., 1895, M. E..... Toledo, Ohio.	President and Manager, W. G. Nagel Electric Company.
Nauss, Ralph W., 1901, B. Sc. (Chem.). Columbus, Ohio.	Post-graudate Student, Ohio State University.
Needham, Harry S., 1900, M. E.... Indianapolis, Ind.	Special Apprentice, Pennsylvania R. R.
Newton, Samuel Donald, 1895,C.E. Knoxville, Tenn.	Civil Engineer, Southern Railway.
Nicholson, Charles M. 1900, E. E. Cincinnati, Ohio.	Engineer, Bullock Electrical Mfg. Co.
Nidy, Herbert C., 1901, E. E....... Millers School, Va.	Superintendent Electrical Department and Instructor in Machine Shop, Miller Manual Labor School.
Nold, John H., 1900, E. M......... Columbus, Ohio.	Mine Engineer, Assistant to F. A. Ray.
Nurian, Kerson, 1899, M. E........ Pittsburgh, Pa.	Engineer, Westinghouse Electric & Manufacturing Co.

O

O'Brine, David, 1881, B. Sc., M. Sc.; 1882, E. M., D. Sc., M. D. Urbana, Ohio.	Physician and Surgeon.
Orton, Edward, Jr., 1884, E. M..... Columbus, Ohio.	Professor of Ceramics, Ohio State University, State Geologist of Ohio.

P

Pabodie, Robert Jewett, 1899, M.E. Watertown, N. Y.	Assistant General Foreman, Watertown Steam Engine Company.
Palmer, Walter K., 1893, M. E..... Kansas City, Mo.	Consulting Mechanical and Electrical Engineer.
Patch, Homer Austin, 1896, C E... Minneapolis, Minn.	Draughtsman, American Bridge Co.

Payne, Halbert Edward, 1887, M.E. New York City.	President American Typewriter Company.
Pearl, Allen Sexton, 1894, E. E... Chicago, Illinois.	Ohio Representative of Central Electric Company, Chicago, Ill.
Pedlow, Edward B., 1893, C. E..... New Straitsville, Ohio.	General Superintendent, C. & H. C. & I. Co.
*Pence, David Arrel, 1894, M. E...	Died, December 15, 1901.
Peppel, Samuel Vernon, 1899, B.Sc. (Chem.). Columbus, Ohio.	Chemist, Ohio Geological Survey.
Peters, William L., 1885, M. E.... Riverside, California.	Merchant and Horticulturist.
Peirce, John Mattison, 1895, E. E. South Charleston, Ohio.	
Pilcher, Hastings Moore, 1895, E.E. Dundee, Natal, S. A.	Electrician.
Pleukharp, Rev. C. V., 1885, M. E. La Crescenta, Cal.	Clergyman.
Polk, Walter C., 1895, C. E....... Louisville, Ky.	Engineer, Central Construction Co.
Postle, Herman R., 1894, C. E..... Columbus, Ohio.	Teacher in Columbus North High School.
Poto, Frank Bert, 1901, B. Sc. (Chem.). Columbus, Ohio.	Assistant Chemist, National Steel Co.
Powell, Charles S., 1893, E. E.... Cleveland, Ohio.	Manager Cleveland Office, Westinghouse Electric & Mfg. Co.
Pratt, Fred Kellogg, 1900, C. E.... Cleveland, Ohio.	Draughtsman, Wheeling & Lake Erie R. R.

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*Dead.

R

Rawson, Levi, 1899, C. E......... Sistersville, W. Va.	Engineer, Carter Oil Company.
Ray, Frank A., 1887, E.M........ 137 King Avenue, Columbus, Ohio.	Professor of Mine Engineering, Ohio State University.
Ray, William M., 1893, C. E....... Cleveland, Ohio.	Assistant Engineer, B. & O. R. R. Co.
Raymond, Coles Abel, 1894, C. E... Toledo, Ohio.	Draughtsman, American Bridge Co.
Reed, Robert Browning, 1896, E. E. Zanesville, Ohio.	Partner, Zanesville Electrical Co.
Reed, William Allen, 1897, E. M. Querida, Colorado.	Mining Engineer, Bassick Gold Mine Co.
Reeves, Archibald C., 1887, C. E... Dayton, Ohio.	Assistant City Engineer.
Rice, Herbert A., 1897, C. E....... Ironton, Ohio.	Civil Engineer with Ironton Portland Cement Co.
Riddle, Howard Sterling, 1897, E.E. Akron, Ohio.	Mechanical Engineer, The Diamond Rubber Co.
Roberts, Cyrus Swan, 1898, E. M. Santa Barbara, Chihuahua, Mexico.	Chief Engineer and Assistant Superintendent of Montezuma Lead Company.
Robinson, Erdis Geroska, 1893, C.E. Mexico, D. F.	Engineering Department, Mexican Central Railway.
Rogers, James Bertrand, 1896, E.M. Leetonia, Ohio.	Chemist, Salem Iron Company.
Root, Willis J., 1885, E. M........ Columbus, Ohio.	General Superintendent, National Steel Co., Columbus Works.
Rowlee, Henry A., 1897, M. E..... Philadelphia, Pa.	Inspector, Ordnance, U. S. Army.

Ruhlen, Carl Marble, 1898, M. E. Tacoma, Wash.	Assistant Quartermaster's Agent, U. S. Army.
Ryland, Paul D., 1901, C. E. Columbus, Ohio.	Assistant on Engineer's Corps, Maintainance of Way Department, C. S. & H. R. R.

S

Schaub, Edward L. T., 1885, M. E. Columbus, Ohio.	Assistant Superintendent, Associated Charities.
Schaup, Charles E., 1897, E. M.	
Scheibell, William O., 1888, E. M. Columbus, Ohio.	General Manager, The American Art Tile Company.
Schreiber, George Ernst, 1900, E.E. St. Louis, Mo.	Electrical Engineer, with H. H. Humphrey.
Schreiber, John Martin, 1899, E.E. Cleveland, Ohio.	Engineering Department, Cleveland Electric Street Railway.
Schroll, Otto, 1886, C. E. Wheeling, W. Va.	Superintendent, Wheeling Terminal R. R. Co.
Sedgwick, Edgar C., 1895, E. E. Columbus, Ohio.	Chief Engineer, The Case Manufacturing Company.
Serva, Adam A., 1893, E. E. Ft. Wayne, Indiana.	Assistant Sales Manager, Fort Wayne Electric Works.
Sharp, Charles C., 1888, C. E. Boomer, W. Va.	President Raven Coal and Coke Co. and Superintendent Boomer Coal and Coke Co.
Shepherd, Charles W., 1900, C. E. Chicago, Illinois.	Draughtsman, North Works Illinois Steel Co.
Sherman, Chris. E., 1894, C. E. Columbus, Ohio.	Professor of Civil Engineering, Ohio State University.
Sherman, John K., 1901, C. E. Pittsburgh, Pa.	Assistant on Engineer Corps, P. C., C. & St. L. Ry.

Simonton, Mark, 1895, E. E....... Columbus, Ohio.	Treasurer and General Manager, Electric Supply & Construction Company.
Skinner, Charles E., 1890, M. E... Pittsburgh, Pa.	Engineer, Electrical Engineering Department, Westinghouse Electric and Manufacturing Co.
Smith, David William, 1899, C. E. Columbus, Ohio.	Assistant Engineer, Hocking Valley Ry. Co.
Snider, Charles M., 1897, B.Sc. (I.A.) Columbus, Ohio.	Draftsman, The Jeffrey Mfg. Co.
Sperr, Frederick W., 1883, E. M.... Houghton, Michigan.	Professor of Civil and Mining Engineering, Michigan College of Mines.
Sprague, Clarence M., 1899, C.E... Pittsburgh, Pa.	Assistant on Engineering Corps, P., C., C. & St. L. Ry., Pittsburgh Division.
Spurrier, John Rudolph, 1896, E.E. Manchester, England.	Foreman Detail Division of Mechanical Department of British Westinghouse Electric and Manufacturing Co.
Staley, Marcellus, 1899, E. E..... New York, N. Y.	Firm of Staley & Thompson, Electrical Contractors.
Starbuck, Daniel Karl, 1899, E. E. Flagship Chicago, U. S. N.	Chief Electrician.
Stewart, Hartford T., 1896, E. E... Columbus, Ohio.	Agent, General Electric Company.
Stewart, Lee Raymond, 1896, C. E. Camden, New Jersey.	Engineer in Charge of Mould Loft, New York Ship Building Co.
Stinebaugh, Isaac Long, 1892, C. E. Rockaway, Ohio.	Surveyor and Civil Engineer.
Stone, Carleton Elijah, 1899, C. E. Coraopolis, Pa.	Civil Engineer, The Pittsburg and Lake Erie Railroad Co.
Storer, Norman Wilson, 1891, E. E. Pittsburg, Pa.	Westinghouse Electric & Manufacturing Company.

Storer, Simon B., 1893, E. E....... Syracuse, New York.	Engineer and Salesman, Westinghouse Electric & Manufacturing Company.
Stull, Emmett Willett, 1894, E. E. Johnstown, Pa.	Engineer, Motor Department, Lorain Steel Co.
*Stump, John William, 1895, C. E.	Died May 31, 1900.

T

Taylor, Arthur W., 1893, E. M.... Cleveland, Ohio.	Chemist, Otis Steel Company, Ltd.
Thomas, James O., 1897, C. E...... Columbus, Ohio.	Wire Chief, Central Union Telephone Company.
Tomlinson, James Rowe, 1892, C. E. Chillicothe, Ohio.	Civil Engineer.
Towne, Robert S., 1879, B. Sc.; 1880, E. M. New York City.	President, Compania Metalurgica Mexicana.
Tufts, Charles Hill, 1899, E. M... Allegheny, Pa.	Chief Chemist, Edith Furnace, American Steel and Wire Co.
Turner, Arthur M., 1893, E. E... 281 Oak St., Chicago, Ill.	

U

Urban, Harry M., 1898, C. E....... Pittsburgh, Pa.	Assistant Supervisor, P., C., C. & St. L. R. R. Co.

V

Vandervoort, W. P., 1886, E. M....	
Viets, Willis B., 1886, E. M....... Parryville, Carbon Co., Pa.	Chemist, Carbon Iron & Steel Co., Ltd.
Vosskuehler, Joseph H., 1900, M.E. Columbus, Ohio.	Instructor in Drawing, Ohio State University.

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* Dead.

W

Wadsworth, F. L. O., 1888, E. M.; 1889, M. E., B. Sc. Allegheny, Pa.	Director Allegheny Observatory.
Walker, James Madison, 1896, C.E. Harrisville, Ohio.	Resident Engineer, W. & L. E. R. R.
Watt, Sern P., 1886, M. E. Morgan Park, Illinois.	Designer and Mechanical Expert of Hine-Watt Manufacturing Company, Chicago, Ill.
Webber, Frederick Clarance, 1901, B. Sc. (Chem.). Manhatan, Kansas.	Assistant in Chemistry, Kansas State Agricultural College.
Weick, C. W., 1898, B. Sc., (I. A.). New York, N. Y.	Instructor in Manual Training, Teachers' College, Columbia University.
Welch, Clark J., 1888, C. E. 11 Broadway, New York, N. Y.	Bridge and Structural Engineer.
Welch, Oliver Bartlett, 1895, E. E. Dennison, Ohio.	General Manager, United Electric Company.
Wilcox, Alva Newton, 1895, E. E. Dayton, Ohio.	The Pinneo and Daniels Co.
Williamson, Homer D., 1901, B. Sc. (Chem.). Columbus, Ohio.	Chemist with Ohio State Board of Health and Starling Medical College.
Wirthwein, Louis P., 1899, C. E. Columbus, Ohio.	In City Engineer's Office.
Wise, Albert Joseph, 1898, C. E. Anderson, Ind.	Supervisor of Track, 5th District, Cleveland & Indianapolis Div., C., C., C. & St. L.R. R.
Wolf, Herman Howard, 1895, C. E. U. S. Steamer Dexter.	Lieutenant, U. S. Revenue Cutter Service.

Z

Zaumseil, Oscar C., 1887, C. E. Webb City, Mo.	Merchant.
Zurfluh, William N., 1894, E. E. Springfield, Ohio.	Superintendent, Home Lighting, Power and Heating Company.

List of Graduates from Other Colleges of the Ohio State University Who are now doing Engineering Work

Bradford, Ernest, 1892, G. Ph. Columbus, Ohio.	Analytical Chemist, with Prof. N. W. Lord.
Calkins, William B., 1898, G. Ph. Denver, Col.	Engineer of Fuel Gas Appliances, Denver Gas and Electric Co.
Converse, Howard P., 1887, B. Sc. Boston, Mass.	Manager Structural Dept., New England Office, Jones & Laughlin Co.
Evans, Ernest, 1892, B. Sc. Zanesville, Ohio.	Superintendent National Steel Co.
Heath, Arthhr T., 1887, G. Ph. Oak Harbor, Ohio.	Analytical Chemist, Consulting Engineer and Contractor.
Humphrey, J. Scott, 1879, B. Sc. Alexandria, Indiana.	City Civil Engineer.
Jones, Jesse Lee, 1890, B. A. Philadelphia, Pa.	In charge of Testing Department, William Cramp & Sons, Ship Builders.
Kirker, Harry L., 1889, B. Sc. Havre, France.	Electrical Engineer, Societe Anonyme Westinghouse.
Knopf, George W., 1883, B. Sc. Pencoyd, Pa.	Engineer, American Bridge Co.
Lewis, Thomas K., 1894, B. Sc. Columbus, Ohio.	Instructor, Department of Architecture and Drawing, Ohio State University.
Lovejoy, Jesse R., 1884, B. Sc. Schenectady, N. Y.	Manager Lighting, Railway and Supply Department, General Electric Company.
McDowell, John A., 1882, B. Sc. Columbus, Ohio.	Chemist, Specialty Portland Cement Manufacture. Mine Examiner.
Mix, Edgar W., 1888, B. Sc. Paris, France.	Chief Engineer, Le Societe des Etablissement Postel-Vinay et La CieFrancaiseThompson-Houston.

Moyer, Henry E., 1893, B. Sc..... Youngstown, Ohio.	Chief Chemist, Youngstown Steel Company.
Newton, Harry S., 1889., B. Sc... Beaver Falls, Pa.	General Manager, Beaver Valley Traction Company.
Phelps, Cyrus Alba, 1892, B. Sc.. San Jose de Ranchos, Sombrerete, Mexico.	Secretary, Cia Minera "Huiriachie," S. A.
Ritchey, Joseph C., 1890, B. Sc..... Sault Ste Marie, Ontario.	Chemist, Lake Superior Power Co.
Scott, Charles Felton, 1885, B. A. Pittsburg, Pa.	Chief Electrician, Westinghouse Electric & Manufacturing Co.
Short, Sidney H., 1880, B. Sc..... 112 Cannon St., London, E. C., England.	Technical Director, English Electric Mfg. Co.
Somermeier, Edward E., 1898, G. Ph. Ohio State University.	Instructor in Metallurgy, Ohio State University.
Ward, John C., 1880, B. A........ Painesville, Ohio.	County Engineer and Surveyor.
Wikoff, John Burkett, 1884, B.Ph. Cambridge, Ohio.	Manager, Cambridge Works, American Sheet Steel Co.

Directory of Those Who have Completed Short Courses

ARCHITECTURE.

Elliott, Emmet F., 1901 Youngstown, Ohio.	Architectural Draughtsman.
Gleichauf, Frank S., 1901 Columbus, Ohio.	Draughtsman, Richards, McCarty & Bulford, Architects.
Miller, Charles E., 1900 Akron, Ohio.	Draughtsman, Diamond Rubber Co

CERAMICS.

Adams, John Carroll, 1897 Lynchburg, Va.	Timber Purchaser.
Berkey, Leslie Reese, 1899 Bolivar, Pa.	Foreman, No. 4 Works, Reese, Hammond & Co., Fire Brick Makers.
Bleininger, Albert V., 1897; 1901, B. Sc., (Chem.). Columbus, Ohio.	Instructor in Ceramics, Ohio State University.
Braddock, Everett F., 1896 Los Angeles, Cal.	Assistant to General Purchasing Agent, Santa Fe R. R.
Campbell, Augustine Ray, 1898 Tottenville, S. I., New York.	Chemist, Atlantic Terra Cotta Co.
Colgan, Frank J., 1901 Detroit, Mich.	With F. B. Holmes & Co., Brick Mfrs.
Giessen, Carl, 1896 Canton, Ohio.	
Gates, Ellis D., 1901 Terra Cotta, Ill.	Chemist, American Terra Cotta & Ceramic Co.
Gorton, Elmer Ellsworth, 1896 Tonawanda, N. Y.	
Hensel, Otto, 1897 Chicago Heights, Ill.	Chemist, Ludowici Roofing Tile Company.

Ittner, Warren Wayne, 1899..... Bellville, Illinois.	Superintendent of the Anthony Ittner Brick Company.
Jones, Edward J. 1896............. Covington, Ky.	Ceramist in Charge of Glazes, Clay Formulate, Colors and Kilns.
Morrison, Frank H., 1901......... Denver, Col.	Ceramic Engineer with Denver Pressed Brick Co.
Post, Malcolm Phelps, 1899....... St. Louis, Mo.	With Paddock-Hawley Iron Co.
Purdy, Ross C., 1898.............. Macomb, Ill.	Superintendent Buckeye Pottery Co.
Thomas, David C., 1896............ Wellsville, Ohio.	Chemist and Head Burner, U. S. Pottery Co.
Watts, Arthur S., 1901........... Findlay, Ohio.	Ceramic Expert and Superintendent, Insulator Department, Bell Pottery Co.
Wolfley, John W., 1896........... Anderson, Indiana.	Burner, Columbia Encaustic Tile Company.
Worcester, Wolsey G., 1899........ Winton Place, Cincinnati, Ohio.	Superintendent, Cincinnati Roofing Tile & Terra Cotta Company.

INDUSTRIAL ARTS.

Benbow, James D., 1901........... Columbus, Ohio.	Draughtsman, Mining Department. Jeffrey Mfg. Co.

MINING.

Anderson, Arthur, 1898.
Athens, Ohio.

Blower, J. W., 1892.
Mine Manager, Trimble, Ohio.

Bohm, Oscar Herman, 1899.
Cleveland, Ohio.

Boyd, Arthur, 1893.
Mine Surveyor, Saginaw, Mich.

Evans, John M., 1895.

Fyfe, John, 1891.

Gildroy, R. E., 1891.

Harrigan, Archer, 1899.
Mining Engineer, Sun, W. Va.

MINING — Concluded.

Brophy, John S., 1898.
Frostburg, Md.

Carroll, P. H., 1891; 1894, E. M.
Herrin, Ill.

Dixon, C. F., 1890.

Jenkins, Jonathan, 1891.
Mine Foreman, Lord, Md.

King, Francis E., 1900.
Mine Foreman, Leisenring, Pa.

Laviers, Henry, 1893.
Wellston, Ohio.

Lochrie, John, 1890.
Supt. of Mines, Windber, Pa.

McKay, R. F., 1894.
Clerk in M. of W. Dept. B. R. & P. Ry., Eagle, N. Y.

Moss, James, 1891.
Supt. and Mining Engineer, Buffalo, Ohio.

Newton, E. A., 1893.
Gen. Mngr. Albemarle Zinc and Lead Co., Philadelphia, Pa.

Nichols, J. L. D., 1895.

Oakes, C. H., Jr., 1892.
Supt. Mines, Leesburg, Pa.

Phillips, F. R., 1893.

Harrigan, Patrick, 1898.
Mine Foreman, Modoc, Ohio.

Herron, J. S., 1893.

Quigley, John, 1893.
Mine Foreman, Snow Shoe, Pa.

Quigley, Robert, 1894.
Mine Foreman, Burnside, Pa.

Quinn, John, 1891.
Civil and Mining Engineer, Houtzdale, Pa.

Ralston, William, 1896.
Cleveland, Ohio.

Rees, David, 1891.

Rees, Evan, 1895.
Mining Engineer The Fluhart Coal and Mining Co., Wellston, Ohio.

Siddall, J. W., 1901.
Mine Engineer for Slater and Poston Coal Co., Floodwood, Ohio.

Snedden, James, 1892.

Tetlow, W. A., 1892.
Salem, Ohio.

Wright, John, 1892.
Redburn, Pa.

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UNIVERSITY BULLETIN SERIES 7—No. 4

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

OHIO STATE UNIVERSITY

1903-1904

COLUMBUS
PUBLISHED BY THE UNIVERSITY

Entered at the Postoffice at Columbus, Ohio, as second-class matter

OHIO STATE UNIVERSITY

CATALOGUE

OF THE

COLLEGE OF ENGINEERING

COURSES OF INSTRUCTION, BUILDINGS, EQUIPMENT
FACULTY, ALUMNI

1903-1904

COLUMBUS
PUBLISHED BY THE UNIVERSITY
APRIL, 1903

DAYS AND DATES

1903

Summer Courses in Surveying	June 19 to	July	17
Summer Courses in Shopwork	June 22 to	July	18
Entrance Examinations (8 A. M.)	Monday, Tuesday,	September September	21 22
FIRST TERM BEGINS—Registration Day	Tuesday,	September	22
Lectures and Class-work begin	Wednesday,	September	23
Meeting of Trustees	Wednesday,	September	23
President's Annual Address	Friday,	September	25
Thanksgiving Recess	Thursday, Friday,	November November	26 27
Latest Date for Filing Thesis Subjects	Tuesday,	December	15
FIRST TERM ENDS	Wednesday,	December	23

Christmas Vacation

1904

SECOND TERM BEGINS—Registration Day	Tuesday,	January	5
University Day	Monday,	February	22
SECOND TERM ENDS	Friday,	April	1

Spring Vacation

THIRD TERM BEGINS—Registration Day.	Wednesday,	April	6
Meeting of Trustees	Wednesday,	April	6
Field Day—Athletic Association	Saturday,	May	14
Senior Class-work ends	Saturday,	May	28
Competitive Drill—Cadet Battalion	Saturday,	May	28
Memorial Day	Monday,	May	30
Latest Date for Presenting Thesis	Friday,	June	10
Final Examinations	Monday, to Friday,	June June	13 17
Latest Date for filing bound copy of Thesis	Friday,	June	17
Baccalaureate Sermon	Sunday,	June	19
Entrance Examinations (8 A. M.)	Monday, Tuesday,	June June	20 21
Class Day	Monday,	June	20
Meeting of Trustees	Tuesday,	June	21
Alumni Day	Tuesday,	June	21
COMMENCEMENT	Wednesday,	June	22
Summer Courses in Surveying	June 17 to	July	15
Summer Courses in Shopwork	June 20 to	July	16

Summer Vacation

Entrance Examinations (8 A. M.)	Monday, Tuesday,	September September	19 20
FIRST TERM BEGINS—Registration Day	Tuesday,	September	20
Lectures and Class-work begin	Wednesday,	September	21
Meeting of Trustees	Wednesday,	September	21
Annual Address by the President	Friday,	September	23

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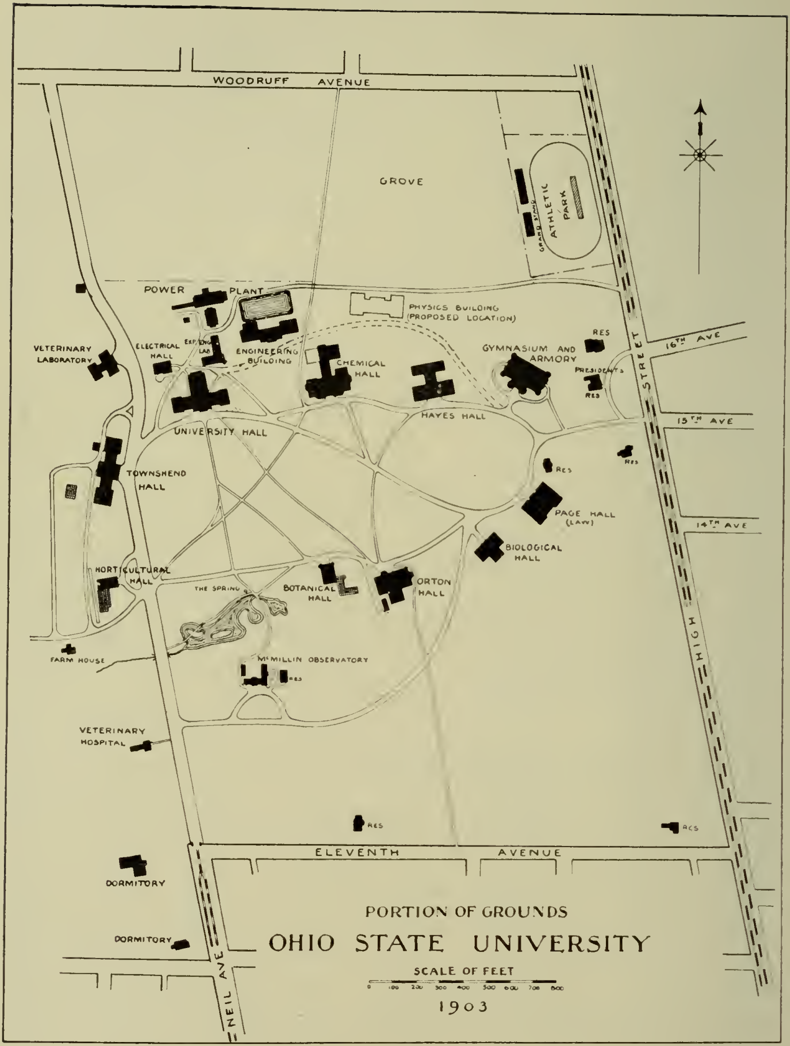


PORTION OF GROUNDS

OHIO STATE UNIVERSITY

SCALE OF FEET

1903

THE OHIO STATE UNIVERSITY

An act of Congress was passed July 2, 1862, whereby large grants of public land were set apart for the purpose of establishing "colleges where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such a manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In accordance with this act, the Ohio State University was founded by the State as a public institution of learning. The governing body of the institution is a Board of Trustees, appointed by the Governor of the State for terms of seven years, as provided in the law organizing the University. The original endowment has been supplemented, and the objects of the University promoted, by a permanent annual grant from the United States, under an act of 1890, by special appropriations of the General Assembly; and in 1891, by a permanent annual grant from the State, which grant was doubled by the Legislature of 1896. Through the aid which has been received from the United States and from the State, it is enabled to offer its privileges, with a slight charge for incidental expenses, to all persons of either sex who are qualified for admission.

The University is divided into six colleges as follows:

The College of Agriculture and Domestic Science.
The College of Arts, Philosophy and Science.
The College of Engineering.
The College of Law.
The College of Pharmacy.
The College of Veterinary Medicine.

Each of the above named colleges is under the direction of its own Faculty, which has power to act in all matters pertaining to the work of the students of that particular college. The aim of the University is to give to the young men and women of Ohio the largest possible opportunity for both general and special training, in order to prepare them for the various duties of life.

The University is situated within the corporate limits of the City of Columbus, two miles north of the Union Depot

and about three miles from the State Capitol. The University grounds consist of three hundred and thirty acres. The western portion, about two hundred acres, is devoted to agriculture and horticultural purposes, and is under the management of the College of Agriculture and Domestic Science. The eastern portion is occupied by the principal University buildings, fourteen in number, the campus, athletic and drill grounds, a park-like meadow, and a few acres of primitive forest.

THE COLLEGE OF ENGINEERING

Since the inception of the University, the College of Engineering has maintained a vigorous and steady growth. To a large extent this growth represents the demand of the people from whom the University derives its support, for it has been the constant policy of the University to enlarge and foster each branch of educational work in response to every intelligent demand.

Yet it is true that the State has advanced and shaped public opinion by providing educational facilities somewhat in advance of public demand. Through its University it has established and built up a system of technical education which is more important than any other single agency in the development of the commercial and industrial interests of Ohio. The marvelous industrial progress made in this State and country in recent years is the best indication of the benefits which have already begun to accrue from the enlargement of technical training, and from its constant subdivision and expansion.

At present the College offers instruction in nine important fields of Engineering work. Covering these, the following four year courses of study are given:

1. Architecture, leading to the degree of Civil Engineer in Architecture (C. E. in Arch.). Established in 1900.

2. Ceramics, leading to the degree of Engineer of Mines in Ceramics (E. M. in Cer.). Established in 1896.

3. Chemical Engineering, leading to the degree of Bachelor of Science in Chemical Engineering (B. Sc.). Established in 1902.

4. Civil Engineering, leading to the degree of Civil Engineer (C. E.). Established in 1873.

5. Electrical Engineering, leading to the degree of Mechanical Engineer in Electrical Engineering (M. E. in E. E.) Established in 1889.

6. Industrial Arts, leading to the degree of Bachelor of Science in Industrial Arts (B. Sc.). Established in 1893.

7. Manual Training, leading to the degree of Bachelor of Science in Industrial Arts (B. Sc.) Established in 1893.

8. Mechanical Engineering, leading to the degree of Mechanical Engineer (M. E.). Established in 1879.

9. Mining Engineering, leading to the degree of Engineer of Mines (E. M.). Established in 1878.

The following short courses do not lead to degrees, but students completing them are furnished with formal certificates setting forth the work they have accomplished:

10. Clay-working, two years. Established in 1894.

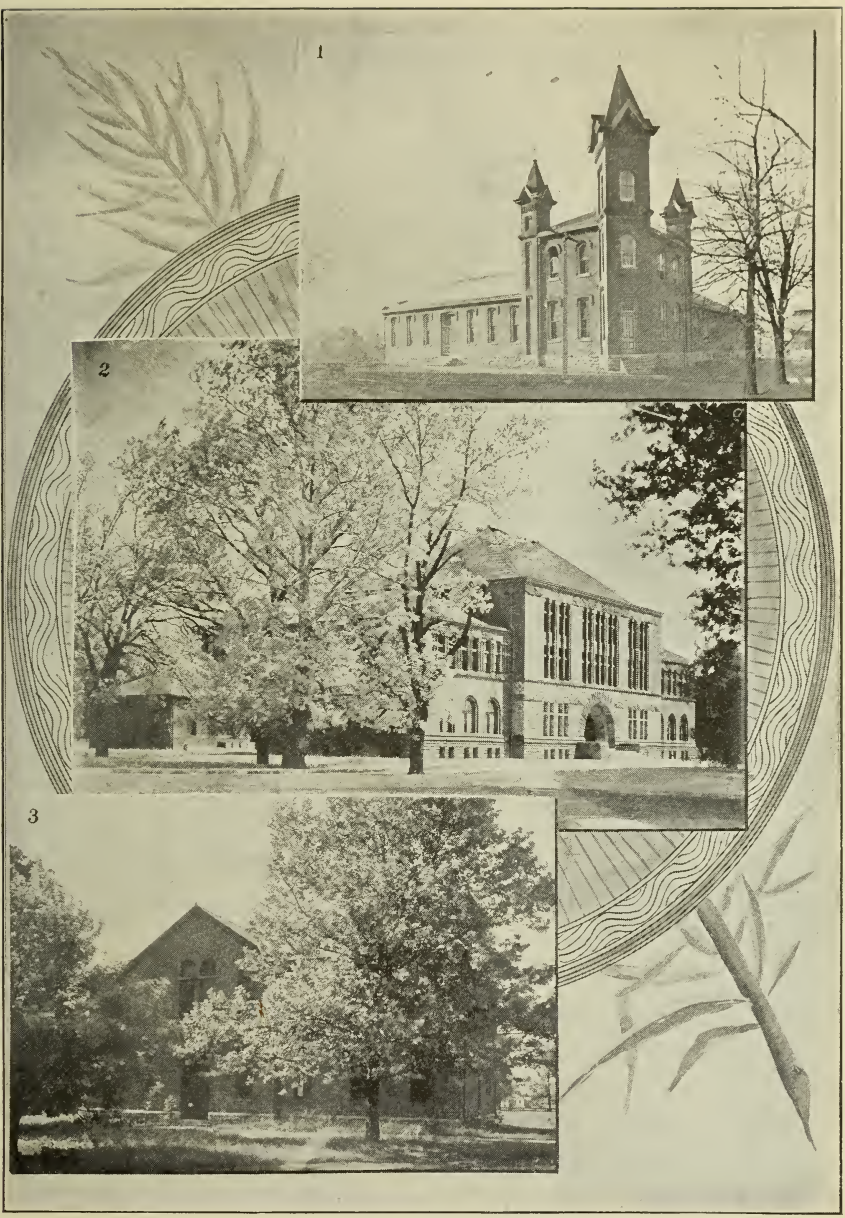
11. Industrial Arts and Shopwork, two years. Established in 1896.

12. Mining, two years. Established in 1887.

The instruction necessary to the completion of these various courses of study is given in twenty-one different departments, under eighty-eight professors and assistants. In addition, in some of the courses in the College elective work is offered, which may be taken from any of the thirty-seven departments of the University.

The various departments directly connected with the College of Engineering, occupy about two-thirds of Chemical Hall, nearly the whole of Hayes Hall, the whole of the Mechanical and Electrical buildings, portions of Orton Hall and of the main University building. On March 16, 1903, ground was broken for a new Engineering building; this building will be occupied exclusively by the Departments of Architecture and Drawing and of Civil Engineering. The equipment for teaching technical and scientific subjects is, in the main, excellent, and in some departments is exceptional. In all departments the annual increase in apparatus and facilities is rapidly making the equipment larger and more efficient.

The Library of the University, consisting of about 50,000 volumes, is able to fill the demands of the Engineering students for the most important treatises in their respective fields of science.



1—MECHANICAL HALL
2—HAYES HALL
3—ELECTRICAL BUILDING

CORPS OF INSTRUCTION

REV. WILLIAM OXLEY THOMPSON, D. D., LL. D.......University Grounds
President of the University.

EDWARD ORTON, JR., E. M., DEAN .. ..The Normandie
Professor and Director of the Department of Clayworking and Ceramics.

NATHANIEL WRIGHT LORD, E. M..................338 West Eighth Avenue
Professor of Metallurgy and Mineralogy and Director of the School of Mines.

SIDNEY AUGUSTUS NORTON, Ph. D., LL. D..........363 East Town Street
Emeritus Professor and Lecturer in General Chemistry.

STILLMAN W. ROBINSON, C. E., D. Sc.................1353 Highland Street
Emeritus Professor of Mechanical Engineering.

BENJAMIN FRANKLIN THOMAS, Ph. D..................University Grounds
Professor of Physics.

GEORGE WELLS KNIGHT, Ph. D.......................85 Jefferson Avenue
Professor of American History and Political Science.

ROSSER DANIEL BOHANNAN, B. Sc., C. E., E. M..16th and Indianola Aves
Professor of Mathematics.

*ERNST AUGUST EGGERS...... .. ..190 West Eleventh Avenue
Professor of the Germanic Languages and Literatures.

BENJAMIN LESTER BOWEN, Ph. D...................775 East Broad Street
Professor of the Romance Languages and Literatures.

JOSEPH VILLIERS DENNY, B. A...................230 West Tenth Avenue
Professor of Rhetoric and the English Language.

WILLIAM THOMAS MAGRUDER, M. E.....................191 King Avenue
Professor of Mechanical Engineering.

WILLIAM McPHERSON, JR., D. Sc., Ph. D..............University Grounds
Professor of Chemistry.

JOSEPH NELSON BRADFORD, M. E..................54 West Tenth Avenue
Professor of Architecture and Drawing.

CHRISTOPHER P. LINHART, M. D...........................The Vendome
Professor of Physical Education and Director of the Gymnasium.

---

* Died April 8, 1903.

HENRY CURWEN LORD, B. Sc.........................University Grounds
Professor of Astronomy and Director of the Emerson McMillin Observatory.

FREDERICK CONVERSE CLARK, Ph. D....................1634 Neil Avenue
Professor of Economics and Sociology.

FRANK EDWIN SANBORN, S. B., Secretary........... 303 West Eighth Avenue
Professor and Director of the Department of Industrial Arts.

FRANK ARNOLD RAY, E. M..............................137 King Avenue
Professor of Mine Engineering.

GEORGE L. CONVERSE, Captain U. S. A. (Retired)........94 Hoffman Avenue
Professor of Military Science and Tactics.

EMBURY ASBURY HITCHCOCK, M. E...............380 West Eighth Avenue
Professor of Experimental Engineering.

FRANCIS CARY CALDWELL, B. A., M. E.............401 West Sixth Avenue
Professor of Electrical Engineering.

CHARLES SMITH PROSSER, M. S....................114 West Tenth Avenue
Professor of Geology.

JOHN ADAMS BOWNOCKER, D. Sc........................1594 Neil Avenue
Professor of Inorganic Geology and Curator of the Museum.

ALFRED DODGE COLE, A. M.............................1662 Neil Avenue
Professor of Physics.

CHRISTOPHER ELIAS SHERMAN, C. E......................772 Oak Street
Professor of Civil Engineering and Acting Head of Department.

ALBERT HENRY HELLER, C. E..........................1249 Neil Avenue
Professor of Civil Engineering.

OLIVE B. JONES.....................................53 Eleventh Avenue
Librarian.

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Associate Professor of the Romance Langauges and Literatures.

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Associate Professor of Chemistry.

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Assistant Professor of Machine-Shop Practice.

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Assistant Professor of Electrical Engineering.

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Assistant Professor of Physics.

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HERMINE DE NAGY .... 1332 Highland Street
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J. S. TIDBALL .... 35 Price Street
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†ERWIN G. BAILEY .... 47 West Tenth Avenue
Fellow in Experimental Engineering.

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Fellow in Chemistry.

---

†Term expires June 30, 1903.

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Fellow in Rhetoric and English Language.

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Student Assistant in Electrical Engineering.

LUCIAN SHAW.....................................173 West Ninth Avenue
Student Assistant in Drawing.

†WILBERT MORLAN.................................1554 Highland Street
Student Assistant in Industrial Arts.

T. B. SIMON.................................197 North Washington Avenue
Student Assistant in Mine Engineering.

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†Term expires June 30, 1903.

COURSES OF STUDY

All engineering education is based on the constant use of the fundamental sciences, mathematics, physics and chemistry, supplemented by training in the art of expression, both by language and by drawing. It naturally follows therefore that all engineering courses start from a common point, proceed side by side for a time, but specialize and subdivide more and more as they progress toward completion, until in the last year they present but little work in common.

Further, it is very commonly the case with young men entering college for a technical education, that they are following ambitions not founded on any knowledge of their own natural aptitudes or capacities, and that they are in no way prepared to make a wise or final selection of their life work at that time.

For these two reasons, the work of the first year is made identical in all of the engineering courses leading to a degree. The student is enrolled as a "First-year Engineer." His selection of the course he wishes to pursue is deferred to the opening of his second year, by which time he has become acquainted to some extent with University standards and methods, with the scope of the various courses offered, and with his own tastes and powers.

FIRST YEAR

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mathematics (31) Algebra.	5.	Mathematics (32) Trigonometry.	5.	Mathematics (33) Analytics.	5.
Chemistry (7) Inorganic.	5.	Chemistry (7) Inorganic.	5.	Chemistry (12) Quantitive Analysis.	4.
Modern Language French, Ger. or Spanish.	4.	Modern Language French, Ger. or Spanish.	4.	Modern Language French, Ger. or Spanish.	4.
Rhetoric (1) Composition.	2.	Rhetoric (1) Composition.	2.	Rhetoric (1) Composition.	2.
Rhetoric (21) Public Speaking.	½.	Rhetoric (21) Public Speaking.	½.	Rhetoric (21) Public Speaking.	½.
Drawing (27) Freehand.	2.	Drawing (28) Freehand.	2.	Drawing (32) Lettering.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Drill.	

SUMMER TERM IN SHOPWORK.

Students electing courses named below are required to take Shopwork courses in the summer term as follows:

Chemical Engineering—Shopwork (7) and (11), at the close of the first or second year.

Electrical Engineering— }
Mechanical Engineering— } Two from Shopwork (4), (7) and (11), at the close of the first year.

COURSE IN ARCHITECTURE

This course is designed to prepare men with a thorough knowledge of those phases of engineering employing the materials and methods of architectural construction, and with a special training in appropriate and harmonious use of form, color and decorative design.

Recent years have developed types of buildings without precedent in the history of architecture, in which the amount of unencumbered, internal space obtained is as remarkable as the safety, durability, comfort and healthfulness of the buildings themselves. The ends obtained in the modern, tall, steel-skeleton building would have been utterly impossible in the solid masonry structures of the past.

Mathematics, the foundation for the solution of constructive problems, is studied for two years, and in the technical work of the course its use is constant.

Drawing is an important factor in the education of the architect, and includes that of the engineer and of the artist, being controlled partly by considerations of fact and partly by those of appearance. It extends in some form throughout the course, including freehand, mechanical, descriptive geometry, shades and shadows, perspective, pen-drawing, brush-drawing in color, clay-modeling; and is applied in the architectural designing.

The engineering technical work includes strength of material, testing materials, stresses in trusses and framed structures, masonry, mortars, electricity and surveying.

The rapidly increasing application of electricity in modern buildings requires architects and superintendents of buildings to know the fundamentals of electric construction and, at least, the common sources of danger in its use. To meet this need the course in physics is supplemented with two terms of electrical engineering. For similar purposes in the safe installation of water and steam piping, elevators and power, a laboratory course in experimental mechanical engineering succeeds the regular course in mechanics and strength of materials.

The history of architecture, necessary to broaden the student's architectural knowledge, is given a prominent place, and is freely illustrated by a selected set of lantern slides.

Decoration and ornament comprise a study of the decorative details of the different styles of architecture, both in carved ornament and decorative color.

The technical architecture includes designing architectural structures complete, specifications, heating, ventilating, plumbing, estimates, fire-proofing, superintendence and contracts.

See also pages 39-41.

COURSE IN ARCHITECTURE

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See page 15)

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (36) Descriptive Geom.	5.	Drawing (37) Shades, Shadows.	5.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Architecture (9) Hist'y of Architecture.	3.	Architecture (10) Hist'y of Architecture.	3.	Architecture (11) Hist'y of Architecture.	3.
Architecture (12) Detail Drawing.	2.	Architecture (13) Detail Drawing.	2.	Architecture (14) Detail Drawing.	2.
Drawing (14) Pen Drawing.	2.				
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

THIRD YEAR

Mathematics (71) Statics.	5.	Mathematics (72) Strength Mat'ls, Kinet's	5.	Mathematics (73) Kinetics; Hydraulics.	5.
Architecture (15) Designing.	4.	Architecture (16) Designing.	2.	Architecture (17) Designing.	4.
Drawing (7) Photography.	2.	Drawing (40) Clay Modeling.	2.	Drawing (41) Clay Modeling.	2.
Elec. Eng'ring (6) Lectures.	2.	Elec. Eng. (6) and (7) Lectures and Lab.	4.		
Architecture (5) Decorations, etc.	3.	Civil Eng. (6) Stereotomy.	4.	Civil Eng. (19) Trusses.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.

FOURTH YEAR

Architecture (18) Designing.	4.	Architecture (4) Specifications.	2.	Architecture (6) Estimates and Supt.	4.
Civil Eng. (15) Masonry.	5.	Architecture (7) Heating, Vent., etc.	5.	Architecture (19) Designing.	4.
Mech. Eng. (23) Materials of Const.	4.	Architecture (21) Designing.	2.	Architecture (20) Thesis.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Civil Eng. (21) Surveying.	3.
		Drawing (18) Color Work.	3.	Drawing (19) Color Work.	2.
		Civil Eng. (26) Steel Construction.	3.		

THESIS

COURSE IN CERAMICS

The ceramic industries include according to the classification here adopted, those industries in which the production and utilization of natural and artificial silicates is the end in view, viz., clayware, glass and cement. These three industries constitute a natural division of chemical technology and though they are intimately connected with the field of the metallurgist on the one hand, and with the manufacturing chemist on the other, still they have an individuality which makes their study and exploitation as a separate field of industrial science advisable.

The work which the ceramic engineer must be prepared to supervise is broad and varied. In the preparation of any product of uniform physical and chemical qualities from the crude rocks and minerals of the earth's surface, a knowledge of chemistry is the foremost essential, and no one without the training of the chemical laboratory, in which an account must be rendered for everything, can hope to attain the highest mastery in this subject. In this course, therefore, chemistry forms an important part of the training, beginning with the first term and continuing through three years of purely chemical work, followed by a year of practice in the application of chemistry to ceramic operations.

But the ceramic engineer will be subjected to other calls on his resources. He must be able to intelligently search for and locate deposits of the crude mineral supplies which he needs, and having found them, he must be able to win them safely and economically, whether on the surface or under ground in mines. To this end, the student is given training in mineralogy, geology, both historic and economic, metallurgy, so far as it pertains to fuels and iron, and mine engineering.

Also, like the metallurgist, the ceramist deals with reagents and performs chemical reactions on a gigantic scale; and in the winning of the materials, their mechanical preparation, their economic handling and storage, their manufacture into useful forms, and in the construction of buildings, machinery, kilns and furnaces for these purposes, the knowledge and resources of the trained engineer must constantly re-enforce those of the chemist and geologist. Accordingly the course includes a vigorous drill in mathematics, physics, mechanics, strength of materials, drawing, drafting, shopwork and construction. In addition, at least one year of some modern language, preferably German, and two years in the correct use of the English language are required.

See also pages 44-48.

COURSE IN CERAMICS

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See page 15)

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (34) Descriptive Geom.	3.	Drawing (35) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Ceramics (1) Laboratory.	5.	Ceramics (2) Laboratory.	5.	Ceramics (3) Laboratory.	5.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

THIRD YEAR

Mathematics (71) Statics.	5.	Mathematics (72) Strength Mat'ls, Kinet's.	5.	Mathematics (73) Kinetics, Hydraulics.	5.
Ceramics (4) Raw Materials.	5.	Ceramics (5) Clay Products.	5.	Ceramics (6) Clay Products.	5.
Mine Eng. (4) Mine Surveying.	5.	Ceramics (7) Adv. Chem. Lab.	5.	Metallurgy (2) Mineralogy.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
				Shopwork (11) Forging.	3.

FOURTH YEAR

Ceramics (9) Manf. of Bodies.	5.	Ceramics (10) Glasses and Glazes.	5.	*Ceramics (11) Enamels, Colors.	5.
Metallurgy (4) Fuels and Iron.	5.	Ceramics (12) Cement.	5.	*Ceramics (18) Cement Laboratory.	5.
Shopwork (4) Chipping and Filing.	3.	Ceramics (17) Ceramic Const.	4.	Ceramics (15) Thesis Work.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Mech. Eng. (36) Laboratory.	5.
				Drawing (7) Photography.	2.

THESIS

* Students are to elect Ceramics (11) or (18).

COURSE IN CHEMICAL ENGINEERING

This course has been prepared to meet the growing demand for trained men in the numerous industries which are based upon chemical processes or employ them prominently in their work, and which are not included in the fields of metallurgy and ceramics. Among such may be mentioned the manufacture of acids, alkalis, salts, chemical reagents, paints, colors, dyes, bleaching powders, soaps, glue, gelatine, glycerine, tanning compounds, starch, sugar, dextrine, glucose, alcohol, ferments, preservatives, antiseptics, fertilizers, pyrotechnics, matches and many others.

In accordance with the prevailing views, both of manufacturers and of technical instructors, the Chemical Engineering Course has been somewhat extended along the mechanical side, and the work in chemistry has been planned to afford a thorough drill in general chemistry. On this foundation the details of any industrial application of chemical principles can be readily mastered.

The student begins his chemical work in the first year with general inorganic chemistry and qualitative analysis. This is followed in the second year by a course in quantitative analysis and a continuation of general chemistry; and in the third year by metallurgical analysis and organic chemistry. In the fourth year a course in industrial processes with laboratory work in inorganic preparations is required, together with a term's work each in sanitary analysis of water, and in the elements of the ceramic industry, and two terms in physical chemistry. In addition to this several options are offered in metallurgy, agricultural chemistry and mechanical engineering.

On the engineering side, mathematics is carried through three years; drawing, including free hand, mechanical and technical, is also required through three years. Physics is required in the first two years, mechanics in the third and machine designing in the fourth. A term in the electrical laboratory forms a part of the fourth year's work.

Two years of English and a year of either French or German is required of all engineers. In view of the large chemical literature in the German language all students in the Chemical Engineering Course will find it almost necessary to select the German.

See also pages 49–51.

COURSE IN CHEMICAL ENGINEERING

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See page 15)

Shopwork Courses (7) 3 and (11) 3 are to be taken in Summer Term, at the end of the First or Second Year.

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.	Chemistry (20) Quantitative.	4.
Chemistry (21) Inorganic.	2.	Chemistry (21) Inorganic.	2.	Chemistry (21) Inorganic.	2.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Drawing (33) Projections.	3.	Drawing (34) Descriptive Geom.	3.		
Chemistry (31) Stoichiometry.	2.			Metallurgy (2) Mineralogy.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

THIRD YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (8) Organic.	5.	Chemistry (9) Organic.	5.	*Chemistry (9) Organic.	5.
Metallurgy (5) Laboratory.	5.	Metallurgy (6) Assaying.	5.	*Metallurgy (5) Laboratory.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Mathematics (71) Statics.	5.	Mathematics (72) Strength Mat'ls, Kinet's.	5.	Mathematics (73) Kinetics, Hydraulics.	5.
Drawing (21) Technical.	2.	Drawing (22) Technical.	2.	Drawing (23) Technical.	2.
				Mech. Eng. (32) Power Plants.	5.

*Students are to elect either Chemistry (9) 5, or Metallurgy (5) 5.

FOURTH YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (32) Industrial.	4.	Chemistry (32) Industrial.	4.	Chemistry (15) Sanitary.	4.
Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (19) Machine Design.	5.
Elec. Eng. (6) Lectures.	2.	Chemistry (30) Physical.	3.	Chemistry (30) Physical.	3.
Elec. Eng. (7) Laboratory.	2.	*Mech. Eng. (35) Laboratory.	5.		
*Metallurgy (4) Fuels and Iron.	5.	*Metallurgy (4) General.	5.	Ceramics (16) General Principles.	5.
*Ag. Chemistry (4) Laboratory.	5.	*Ag. Chemistry (4) Laboratory.	5.		
*Chemistry (35) Rare Elements.	3.				

THESIS

* Students are to elect Metallurgy (4), two terms; Agricultural Chemistry (4), two terms (see General Catalogue for description of course); Metallurgy (4) first term, and Mechanical Engineering (35); or Chemistry (35) first term, and Mechanical Engineering (35) or Agricultural Chemistry (4) second term.

COURSE IN CIVIL ENGINEERING

The field of the civil engineer comprises mensuration or surveying and also construction in its broad sense.

While many of the departments have grown into distinct professions, civil engineering, the parent stem, remains with more and larger opportunities than ever before.

As all the problems of the engineer involve the principles of the sciences, these form the ground-work of the course, and while mathematics is the foundation, occupying three years either alone or in its applications, physics, chemistry, geology and astronomy are each given an important place.

The technical work embraces instruction in free hand and mechanical drawing, surveying, and map-making, steel bridges and buildings, masonry structures, roads, streets, railways, water supply, sanitary engineering, the testing of structural materials, and the fundamentals of steam and electrical machinery.

The drawing extends practically through the entire four years. It is designed to fit men to take responsible positions as draftsmen.

The work in surveying includes three terms' work in the text-book and field-work on the campus. At the end of the second year, and again at the end of the third year, the surveying classes are taken into camp for four weeks in a rough country and devote their entire time to surveying. It is expected to fit young men for taking charge at once of a field engineering corps.

Two terms' work is required in steel construction, the first being devoted to the computation of stresses, and the second to the designing, detailing and drawing of roofs, bridges, buildings and other framed structures. The practice of the best bridge shops is followed. The term's work in masonry structure treats of building materials, abutments and piers, retaining walls, dams and masonry arches. Roads, street and railway construction and maintenance are treated at length in text-books and lectures. A term is devoted to each of the subjects of water supply and sanitary engineering.

All through the technical work, frequent references are made to periodicals, transactions of engineering societies and other works on engineering, and the student is required to become familiar with them.

The object sought in all the technical work is to give a thorough training in the theory of subjects, to show how these are applied in practice and to give as much drill as possible in office and field methods.

See also pages 52-56.

COURSE IN CIVIL ENGINEERING

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See page 15)

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (36) Descriptive Geom.	5.	Drawing (35) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Civil Eng. (1) Land Surveying.	6.	Civil Eng. (4) Topog. Drawing.	4.	Civil Eng. (2) Railroad Surveying.	6.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

SUMMER COURSE

Civil Engineering (22) 4 weeks, of 6 days per week. Field work in land and railroad surveying.

THIRD YEAR

Mathematics (71) Statics.	5.	Mathematics (72) Strength Mat'ls; Kinet's.	5.	Mathematics (73) Kinetics; Hydraulics.	5.
Civil Eng. (3) Topog. Surveying.	4.	Civil Eng. (24) C. E. Drawing.	5.	Civil Eng. (7) Bridge Stresses.	5.
Civil Eng. (16) Roads and Streets.	5.	Civil Eng. (6) Stereotomy.	4.	Drawing (7) Photography.	2.
Astronomy (2) Mathematical.	3.	Astronomy (2) Mathematical.	3.	Astronomy (2) Mathematical.	4.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.

SUMMER COURSE

Civil Engineering (23) 4 weeks, of 6 days per week. Field work in railroad and topographical surveying.

FOURTH YEAR

Civil Eng. (8) Bridge Designing.	5.	*Civil Eng. (17) Railways.	5.	Civil Eng. (18) Water Supply.	5.
		*Civil Eng. (25) Adv. Bridge Work.	5.		
Civil Eng. (15) Masonry.	5.	Civil Eng. (14) Cement Testing.	2.	Civil Eng. (10) Sanitary Eng.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6 and 7) Lectures and Lab.	4.		
		Mech. Eng. (17) Laboratory.	3.	Mech. Eng. (25) Laboratory.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.		

THESIS

*Students are to elect either C. E. (17) or C. E. (25).

COURSE IN ELECTRICAL ENGINEERING

The object of this course is to give such training as shall enable the graduate to successfully take up practical work in those branches of engineering in which electricity plays the principal part. In general, the training needed for this purpose is the same as that of the Mechanical Engineer, except that the student need have only a general familiarity with other methods of power generation and utilization, and must, of course, make a very thorough study of the subject of electricity. Consequently, the first two years of the two courses are alike, except as regards shopwork and physics.

A considerable part of the first two terms of the third year is occupied by a thorough training in elementary electrical engineering measurement, such as currents, voltage, capacity, inductance, magnetic flux, etc. This work is given in the Physics Department (see Physics, Course 6, Page 93) The third year also includes training in mechanics, mechanism, machine design, and strength of materials, the latter taught both in the class-room and in the laboratory. In the last term the study of steam machinery is commenced. Work on dynamo machinery is begun in the class-room in the second term, and followed up during the third term in the laboratory.

In the last year of the course, engines and boilers are studied during the first term in the class-room, and during both the first and second terms in the laboratory. Instruction in electrical engineering forms the main part of the work of this year. It is carried on in the class-room, drawing room, and laboratory, and includes besides a thorough course in alternating current machinery, courses upon power transmission and the applications of electricity. Throughout the whole of this year a part of the work is chosen by the student subject to the approval of the head of the department. The end which is kept most in view, is the training of the student to think for himself, and to solve for himself the problems of the engineer.

In the class-room work, the effort is made to acquaint the student with all the best text-books upon the subjects studied. Much stress is laid on the solution of numerical problems by the student. In the drawing room, designs are made of dynamo machinery of different kinds, transformers, house wiring, transmission, etc., the work here being as far as practicable based on the theoretical conclusions reached in the class and laboratory. The equipment is good and is increasing. The work is illustrated by the use of the projection lantern, diagrams and illustrative apparatus.

See also pages 63-66.

COURSE IN ELECTRICAL ENGINEERING

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See page 15)

SUMMER TERM.

Students are required to take *two* of the following Courses in Shopwork in the Summer Term at close of First Year Shopwork (4), (7) and (11).

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (34) Descriptive Geom.	3.	Drawing (35) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (*)	3.	Shopwork (13) Machine Work.	3.	Physics (5) Laboratory.	4.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

* Students are required to take the Shopwork not assigned them in the Summer Term, i. e., Shopwork (4), (7) or (11).

THIRD YEAR

Mathematics (71) Statics.	5.	Mathematics (72) Strength Mat'ls, Kinet's.	5.	Mathematics (73) Kinetics, Hydraulics.	5.
Physics (6) Laboratory.	5.	Physics (6) Laboratory.	5.	Mech. Eng. (32) Power Plants.	5.
Physics (4) Elect'y, Magnetism.	3.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng. (28) Laboratory.	2.
Shopwork (14) Machine Work.	3.	Elec. Eng. (8) D. C. Machinery.	4.	Ind. Arts (7) Mach. Design.	3.
Drawing (5) Technical.	3.			Elec. Eng. (9) Laboratory.	4.

FOURTH YEAR

Elec. Eng. (10) A. C. Machinery.	3.	Elec. Eng. (10) A. C. Machinery.	3.	Elec. Eng. (13) Applications.	5.
Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (11) Laboratory.	3.	Elec. Eng. (11) Laboratory.	3.
Mech. Eng. (33) Engines and Boilers.	5.	Elec. Eng. (14) Designing.	4.	Elec. Eng. (14) Designing.	4.
Mech. Eng. (29) Laboratory.	3.	Elec. Eng. (12) Transmission.	2.		
		Mech. Eng. (30) Laboratory.	2.		
*Elective	3–5.	*Elective	3–5.	*Elective	3–5.

THESIS

* Subject to the approval of the Professor of Electrical Engineering.

COURSE IN INDUSTRIAL ARTS

This course is designed for those who may desire to occupy positions in the various branches of manufacture, not as engineers, but as practical managers, superintendents or business men.

As the growth of engineering has brought about its subdivision into many special lines, such as civil, mechanical, electrical, mining, and chemical engineering, and established special training for each, so the increase in size, importance and scope of the manufactures of the country has made it desirable to especially train young men with reference to filling positions of trust and responsibility in them; to so educate them that they can readily learn the treatment or processes in any special line of manufacture and be able to intelligently superintend; and that they can initiate and put into successful operation new industrial enterprises, or extend and improve old ones.

With this idea in view this course has been planned to give the student special training along industrial and business lines, together with a certain amount of general culture. There will be found in this course a large amount of science training by which the processes of manufacture based upon these laws may be more readily understood; practice in the different shops and in drawing so that a good working knowledge of such operations may be acquired as well as training given to eye and hand, and power of observation and thought developed along mechanical lines: studies into the principles and methods governing the production of the chief materials of construction, the different mechanical movements and their combination in machinery, the use of materials in various constructions, electrical machinery and steam power plants, together with laboratory practice: also the relations of capital and labor, the problems of trade, and the conduct of business enterprises.

This course is well adapted to meet the needs of those young men already employed in industrial pursuits at the machine or bench, who are ambitious to advance to positions of greater responsibility and influence. This course offers an excellent opportunity to such men: it gives them four years of earnest work under good instructors to direct and assist personally, and the advantages of laboratory work to supplement the theoretical book-work. Those intending to take this course should first prepare themselves to meet the entrance requirements as given on page 109. Those unable to spend four years in this course will find on page 36 a short course requiring two years.

See also pages 73-75.

COURSE IN INDUSTRIAL ARTS

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See Page 15)

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (34) Descriptive Geom.	3.	Drawing (35) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Economics (2) Industrial Society.	3.	Economics (3) Indus. and Fin. Hist.	3.	Economics (4) Transportation Problems.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

THIRD YEAR

Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping and Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Mech. Eng. (32) Power Plants.	5.
Economics (1) Elem. of Polit. Econ.	3.	Economics (1) Elem. of Polit. Econ.	3.	Economics (1) Elem. of Polit. Econ.	3.
		Mech. Eng. (22) Timber and Masonry.	3.		

FOURTH YEAR

Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Shopwork (17) Adv. Mach. Work.	3.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Civil Eng. (21) Surveying.	3.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.		
Industrial Arts (3) Shop Equipment.	3.	Industrial Arts (3) Shop Appliances.	3.	Industrial Arts (3) Shop Management.	3.
Industrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.	Industrial Arts (4) Adv. Designing.	3.
Mech. Eng. (12) Laboratory.	2.	Mech. Eng. (29) Laboratory.	2.	Mech. Eng. (30) Laboratory.	2.
Economics (5) Immigration, Money.	2.	Economics (6) Railroads, Crises, etc.	2.	Economics. (7) Labor and Capital.	2.

COURSE IN MANUAL TRAINING

This course is designed for those students who wish to become teachers of manual training in the public schools of secondary grade or in technical schools. Such manual training is based upon knowledge of the relation of the body and brain; its educational value is very great, and recognition of its importance is causing it to be put into more of the schools of the country each year. The advancement of manual training in the schools is retarded by one factor at least, and that is the lack of teachers suitably trained to instruct in its different branches. This course is planned to meet this demand. It is necessary that a teacher of manual training in our public schools be of the same high standard as his associates, in character, general culture, uplifting influence. He must possess knowledge of the methods of instruction, ability in the art of teaching; and coupled with these he must have skill in his technical lines. He must be familiar with the tools, materials and processes used, and acquainted with the different effects on his pupils of the training and work with these. He must understand that enlarged power and ability in the student is what he is seeking; that the pupil himself, and not the inanimate object used is the real product of manual training.

As this course is a professional one, the studies found in it are those which will both broadly and specifically train for the end in view. There is a large amount of science work in physics and chemistry, which work is of importance on account of its fundamental character and the preparation it gives for teaching those subjects. The shopwork of the different kinds will furnish the necessary knowledge and the training of the hand, eye and brain; the drawing will give familiarity with that mode of expression of ideas. The industrial arts treat of mechanical movements and their application to machine tools. There is work in the subjects of electrical machinery and steam power plants that the teacher may be capable of dealing with the power used in his shopwork. The studies in the educational field will present the principles underlying education, the part which the different subjects have in the unfolding or development of the pupil, the laws of his development, so that he can deal intelligently with his pupils.

As this course is arranged the student completing the work will be ready for the teaching of manual training of the high school grade; of the drawing accompanying it; also of the science he may have chosen. Thus he may be able to accept a position in some school where manual training is not taught and can gradually introduce it as opportunity offers.

See also pages 73-75.

COURSE IN MANUAL TRAINING

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR.

(See page 15)

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (34) Descriptive Geom.	3.	Drawing (35) Shades, Shadows.	3.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Physics (3) Problems.	2.	Physics (3) Problems.	2.	Physics (3) Problems.	2.
Shopwork (7) Woodwork.	3.	Shopwork (9) Adv. Pattern Mak'g.	3.	Shopwork (8) Cabinet Work.	3.
Shopwork (3) Foundry.	3.	Shopwork (11) Forging.	3.	Shopwork (12) Adv. Forging.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Education (1) Elem. Psychology.	3.	Education (1) Elem. Psychology.	3.	Education (1) Elem. Psychology.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

THIRD YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (5) Technical.	3.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.	Industrial Arts (1) Tools and Machines.	3.
Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Machine Work.	3.
History (1) U. S. Political.	3.	History (1) U. S. Political.	3.	History (1) U. S. Political.	3.
*Chemistry (20) Quantitative.	4.	*Chemistry (20) Quantitative.	4.	*Chemistry (20) Quantitative.	4.
*Chemistry (21) Physical.	2.	*Chemistry (21) Physical.	2.	*Chemistry (21) Physical.	2.
*Physics (5) Laboratory.	5.	*Physics (5) Laboratory.	5.	*Physics (5) Laboratory.	5.

* Students take either Chemistry (20) and (21) or Physics (5).

FOURTH YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Shopwork (15) Adv. Mach. Work.	3.	Shopwork (16) Adv. Mach. Work.	3.	Mech. Eng. (32) Power Plants.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Mech. Eng. (28) Laboratory.	2.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.		
Education (5) Science of Educ.	3.	Education (5) Science of Educ.	3.	Education (5) Science of Educ.	3.
Polit. Science (1) Polit. Inst. of U. S.	3.				
Electives	2–5.	Electives	5–7.	Electives	5–7.

THESIS

COURSE IN MECHANICAL ENGINEERING

Mechanical Engineering deals principally with the generation of power or effective energy from the forces of nature and the utilization of this power through mechanical devices. The fundamental science underlying this profession is physics, especially that part of physics relating to mechanics and heat, though mathematics is the medium by which these physical principles are made applicable to practical problems.

The training given in this course is designed to equip men with such general and technical knowledge, that they can enter at once and with equal ease into positions in any of the numerous subdivisions of mechanical engineerig, and adapting themselves to the needs of the situation, can rapidly acquire the experience which is essential to that particular work. And at the same time it must be noted that no one lacking this broad preliminary view of the profession as a whole, can ever expect to attain the highest skill in any one of its specialties.

The technical work of the course begins with physics, which is taught by a year's text-book course, supplemented by two terms of laboratory work. This is followed in turn by mechanics, mechanism, the strength of materials, bridge stresses, machine design, thermodynamics, prime movers, steam boilers, shop appliances, hydraulic machinery, and the metallurgy of fuel, iron and steel.

The theoretical principles of these subjects cannot be made real and practical to the student except by an extended system of laboratory courses. Three such are provided, in shopwork, drawing and experimental engineering, respectively. The shopwork course trains the student in those handicrafts in constant use in all mechanical industries, viz., forging, chipping and filing, carpentry, pattern-making, foundry work, and the use of the principal metal-working machine tools.

The course in drawing includes free hand drawing, lettering, projection, descriptive geometry, shades, shadows, perspective and technical drawing, all leading up to the three terms of machine design which teach the student to use this drawing as one of the important tools of his profession.

The experimental engineering, coming in the last year of the course, gives the student opportunity to gain familiarity with boiler tests, determinations of the efficiency of steam power-plants, gas engines, hydraulic and refrigerating machinery, measurements of friction, losses of power in transmission, and many other important technical problems, and is of the greatest use to the student in enabling him to face practical work with confidence in himself.

See also pages 77-83.

COURSE IN MECHANICAL ENGINEERING

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See page 15)

SUMMER TERM

Students are required to take *two* of the following Courses in Shopwork in the Summer Term at the close of the First Year: Shopwork (4), (7) and (11).

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (34) Descriptive Geom.	3.	Drawing (35) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Shopwork (3) Foundry.	2.	Physics (7) Laboratory.	2.	Physics (7) Laboratory.	3.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
Shopwork (*)	3.	Shopwork (*)	3.	Shopwork (13) Machine Work.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

* Students are required to satisfactorily pursue before the Third Term, Second Year, Shopwork Courses (4), (7), (9) and (11). In the First Term they will be assigned one of the two subjects not yet taken successfully, and in the Second Term the other; but Shopwork (7) must precede Shopwork (9).

THIRD YEAR

Mathematics (71) Statics.	5.	Mathematics (72) Strength Mat'ls; Kinet's.	5.	Mathematics (73) Kinetics; Hydraulics.	5.
Mech. Eng. (12) Laboratory.	2.	Mech. Eng. (3) Mechanism.	5.	Mech. Eng. (3) Mechanism.	2.
Drawing (5) Technical.	3.	Mech. Eng. (22) Timber, Masonry.	3.	Drawing (7) Photography.	2.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) Steel.	2.	Civil Eng. (19) Trusses.	5.
Shopwork (14) Machine Work.	3.	Shopwork (15) Adv. Mach. Work.	4.	Mech. Eng. (32) Power Plants.	5.
Mathematics (11) Diff. Equations.	1.				

FOURTH YEAR

Mech. Eng. (33) Engines and Boilers.	5.	Mech. Eng. (34) Thermodynamics.	5.	Mech. Eng. (21) Thesis.	5.
Mech. Eng. (27) Laboratory.	5.	Mech. Eng. (14) Laboratory.	4.	Mech. Eng. (15) Laboratory.	3.
Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (18) Machine Design.	5.	Mech. Eng. (19) Machine Design.	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Industrial Arts (5) Shop Appliances.	3.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.	Mech. Eng. (31) Hydraulic Machinery.	3.

THESIS

COURSE IN MINING ENGINEERING

The profession of mining engineering is peculiar in the wide range of work it covers. It involves two distinct fields; that of the engineer, presented in the locating, exploiting and operating of mining properties, and that of the chemist and metallurgist in the reduction of ores and the treatment of fuels, as in coke manufacture. A man may devote himself largely to either of these departments, but a competent understanding of both is essential to the successful designing and development of mining or metallurgical plants.

The course preparatory to such a profession must be a broad one, including a thorough training in general science, especially chemistry, mathematics, mineralogy and geology, as well as in the use of English, and, as far as possible, foreign languages.

With this as a foundation there must be given special instruction in the arts which are related particularly to mining and metallurgy, and which usually furnish the first employment to the graduate, such as drafting, surveying, technical chemical analysis and assaying. Experience has shown that these subjects can be so taught in college as to enable a man to be of use in the industry during the time in which he is acquiring that experience and judgment which are essential to his ultimate success.

Finally the advanced work of the profession must be fully treated. Such work naturally occupies the later years of the course, being necessarily preceded by the mathematics and the general science training. The course which follows has been framed on these general principles.

The third year is largely devoted to special professional studies. The work in metallurgy is extended and developed in special lectures on the metals, their properties and reduction, fuel, furnaces, refractory materials and the principles of slag formation and furnace charging. Fire assaying of gold, lead and silver ores is taught practically.

The engineering side of the course is developed in this year by training in the principles of construction, as given in mechanics, strength of materials and truss stresses. Surveying is taught by lectures, recitations and extended field practice.

In the fourth year of the course the problems of mine engineering and metallurgical construction are developed in lectures covering the theory and practice of mine development and operation, furnace construction and design, etc., and are supplemented by practical work in the drafting room and by visits to accessible mines and metallurgical works for study and comparison.

See also pages 87–90.

COURSE IN MINING ENGINEERING

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

(See page 15)

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (33) Projections.	3.	Drawing (34) Descriptive Geom.	3.	Drawing (35) Shades, Shadows.	3.
Mathematics (41) Calculus.	5.	Mathematics (42) Calculus.	5.	Mathematics (43) Calculus.	5.
Physics (2) Mechanics, Heat.	3.	Physics (2) Elect'y, Magnetism.	3.	Physics (2) Light, Sound.	3.
Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.	Metallurgy (5) Laboratory.	5.
Shopwork (7) Woodwork.	2.	Shopwork (11) Forging.	2.	Metallurgy (2) Mineralogy.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

THIRD YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mathematics (71) Statics.	5.	Mathematics (72) Strength Mat'ls; Kinet's.	5.	Mathematics (73) Kinetics; Hydraulics.	5.
Metallurgy (4) Fuels and Iron.	5.	Metallurgy (4) General.	5.	Metallurgy (3) Deter. Mineralogy.	5.
Mine Eng. (4) Mine Surveying.	5.	Metallurgy (6) Assaying.	5.	Civil Eng. (19) Trusses.	5.
Rhetoric (2) Expository Writing.	2.	Rhetoric (3) Brief-Making, etc.	2.	Rhetoric (3) Brief-Making, etc.	2.
		Mine Eng. (7) Surveying.	1.		

FOURTH YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.	Mine Eng. (5) Mine Engineering.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Mech. Eng. (36) Laboratory.	5.
Metallurgy (8) Ore Dressing.	2.	Metallurgy (7) Metal. Construction.	3.	Mine Eng. (6) Plans and Specifications	5.
Elec. Eng. (6) Lectures.	2.	Elec. Eng. (6) Lectures.	2.	Drawing (7) Photography.	2.
Elec. Eng. (7) Laboratory.	2.	Elec. Eng. (7) Laboratory.	2.		
		Geology (7) Petrography.	2.		

THESIS

COURSES NOT LEADING TO A DEGREE

The following short courses are offered by the University, in the belief that they will meet the needs of a large class of young men who for any reason will not or cannot obtain the benefits of the thorough courses already described. The University recognizes that there are many valid reasons which may stand in the way of some, whose ability to receive and to use the highest forms of education is without question; and it is thought that in extending opportunities for such training as will be available to these young men, the University is filling a longfelt want in the scheme of engineering education and is certain to grow into closer contact with the industrial life of the State.

No diploma is given to those who complete these courses, but a certificate is issued stating the list of studies which the student has taken in his course, and in which his work has been satisfactory.

The requirements for admission to these short courses are very much lower than for admission to regular collegiate work. It is clear that to reach the young men for whom these courses have been designed, it is necessary that the conditions of admission and attendance shall be shorn of every complication and that the opportunity extended shall be within the grasp of all, and with the minimum of formality or restriction. It is considered, however, that those who accept these opportunities are men, mature in character and steadfast in their purpose to gain sufficient technical education for their needs, and who are making a sacrifice of time at an age when time has begun to be precious.

The somewhat elementary character of some of the work of these courses may attract the attention of some, who as candidates for admission to regular collegiate work could not be admitted on account of their insufficient preparation. To all such students it is proper to state that these courses are in no sense designed as preparatory schools for those who desire ultimately to enter college, and it is not the purpose of the college to permit such use to be made of them. Therefore, every candidate for admission to the short courses must satisfy the Committee on Entrance that his previous experience will enable him to utilize this opportunity in a proper way. For the detailed requirements for admission to these Short Courses see page 115.

SHORT COURSE IN CLAY-WORKING

The two-year or industrial course is designed to assist young men who have already been actively engaged in the Ceramic industries, and who, on account of mature years, or lack of means, or lack of previous educational advantages, are unable to avail themselves of the full and complete course, and yet who wish to increase their earning power or chances of promotion by fitting themselves for other than routine labor. The requirements for admission to this course are very low, and the work required throughout is much less severe than that of the four-year course; in fact, anyone who is willing to really apply himself, can retain his membership in this class, but there is no place for any but those who are thoroughly in earnest, and poor work will not be accepted from those who are able to do good work.

In short, in this industrial course, the department recognizes its closest minimum of communication with the wants of the clay industries, and it is intended to so maintain this course as always to render the greatest good to the greatest number.

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Chemistry (3) Inorganic.	5.	Chemistry (3) Inorganic.	5.	Chemistry (12*a*) Analytical.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Mathematics (1) Algebra.	5.	Mathematics (3*a*) Geometry.	5.	Shopwork (11) Forging.	3.
				Shopwork (4) Chipping, Filing.	2.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

SECOND YEAR

Ceramics (1) Chem. Analysis	5.	Ceramics (2) Anaylsis of Clays.	5.	Ceramics (3) Analysis of Glazes.	5.
Ceramics (4) Raw Materials.	5.	Ceramics (5) Clay Products.	5.	Ceramics (6) Clay Products.	5.
Geology (2) General.	5.	Geology (6) Economic.	3.	Drawing (11) Mechanical.	5.
		Drawing (27) Freehand.	2.		
Drill and Gymnasium		Drill and Gymnasium.		Military Drill.	

See also pages 44-48.

SHORT COURSE IN INDUSTRIAL ARTS

This course is primarily designed to extend the benefits of the same kind of training as that given in the four-year course in this subject to that class of young men who may be unable for any reason to undertake a course of four years' duration, but who aspire to become actively engaged in factory work. It has been the aim to give, in as condensed form as possible, those studies which will most rapidly and easily be turned to practical account in manufacturing operations; such as drawing, shopwork, use of machine tools, etc., together with a grounding in the physics, mathematics and mechanisms which underlie these operations.

The course will be found most valuable to young men already engaged in factory work, who find themselves limited from rising in their work on account of lack of technical education.

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (24) Freehand.	1.	Drawing (25) Freehand.	1.	Drawing (26) Freehand.	1.
Drawing (2) Lettering.	3.	Drawing (38) Projections.	3.	Drawing (39) Drafting.	3.
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Plane Geometry.	5.	Mathematics (13) Space Geometry.	5.	Mathematics (14) Trigonometry.	5.
Shopwork (7) Pattern Making.	3.	Shopwork (9) Adv. Pattern Making.	3.	Shopwork (11) Forging.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

SECOND YEAR

Industrial Arts (8) Machine Drawing.	3.	Drawing (34) Descriptive Geom.	3.	Drawing (35) Shades, Shadows.	3.
Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.	Industrial Arts (1) Tools, Machines.	3.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Shopwork (4) Chipping, Filing.	3.	Shopwork (13) Machine Work.	3.	Shopwork (14) Adv. Machine Work.	3.
Shopwork (3) Foundry.	2.	Industrial Arts (2) Designing.	3.	Industrial Arts (2) Designing.	3.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

See also pages 73-75.

SHORT COURSE IN MINING

The short course in mining is especially designed for young men who have had practical experience in mines, and wish to study mine surveying, drafting, the problems of ventilation, drainage, haulage, mine operating, etc., and also something of the sciences bearing upon their work, but have neither time nor preparation for a full college course. The first year is devoted to a thorough study of the elementary mathematics and sciences necessary to prepare the student for the practical work of the second year. The experience of the past fourteen years has shown beyond any doubt that any enterprising young miner can master the subject sufficiently well in the time assigned to materially increase his earning capacity and chances for promotion in his occupation.

Personal instruction is given, and it is made thoroughly practical and of such a character as to best adapt it to the needs of the individual student.

NOTE—The figure in parenthesis following the name of each study indicates the number of the study in its department. A full description of department work follows this statement of Courses.

FIRST YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.	Mathematics (2) Algebra.	5.
Mathematics (3) Geometry.	5.	Mathematics (13) Space Geometry.	5.	Mathematics (14) Trigonometry.	5.
Physics (1) Elementary.	5.	Physics (1) Elementary.	5.	Geology (1) Phys. Geography.	5.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

SECOND YEAR

FIRST TERM.	Credit hours	SECOND TERM.	Credit hours	THIRD TERM.	Credit hours
Drawing (2) Lettering.	3.	Drawing (38) Projections.	3.	Drawing (39) Drafting.	3.
Drawing (27) Freehand.	2.	Geology (4) Elementary.	5.	Shopwork (11) Forging.	3.
Chemistry (3) Inorganic.	5.	Chemistry (3) Inorganic.	5.	Metallurgy (9) Mineral Chemistry.	5.
Mine Eng. (1) Mine Surveying.	5.	Mine Eng. (2) Ventilat. Haulage.	5.	Mine Eng. (3) Mine Operating.	5.
Drill and Gymnasium.		Drill and Gymnasium.		Military Drill.	

See also pages 87-90.

ARCHITECTURAL DESIGNING

DEPARTMENTS OF INSTRUCTION

ARCHITECTURE

(DEPARTMENT OF ARCHITECTURE AND DRAWING)

Professor Bradford, Associate Professor French

The department occupies the entire third floor, one room on the second floor and one room in the basement of Hayes Hall, and is provided with the following equipment for the illustration of the work and for practical training in the same.

For Architecture:—A well lighted designing room, models in plaster and wood illustrating the constructive and ornamental forms of the different styles of architecture, a collection of architectural photographs and lantern slides, architectural drawings and specifications of erected structures, a collection of plates of architectural forms and ornament, samples of material used in constructive work, instruments for experimental work in heating and ventilating, such as anemometers, weather bureau hygrometers, carbonic acid testers and thermometers. The heating apparatus of the several buildings of the University provide valuable material for this work.

The many and varied architectural structures, which are being continually erected in the city of Columbus and which the students can visit and inspect, furnish material of a practical nature, the value of which cannot be over-estimated. A lecture room provided with electric projection lantern enables the presentation of illustrative material for the different classes.

For Freehand Drawing, Water Color and Oil Painting:—A large studio, specially arranged and provided with adjustable tilting tables and easels; a well selected collection of pencil, pen and ink, charcoal and color specimens of work, wooden models of geometric forms, plaster casts of ornaments, flowers, fruit and the antique.

For Clay-modeling:—A specially arranged and equipped studio for modeling in clay and casting in plaster, consisting of modeling stands, moisture box, casting table, modeling tools of wood and steel, stove and vent-hood for the preparation of gelatine molds and lockers.

For Mechanical Drawing and Mechanical and Architectural Designing:—A large, well-lighted room, provided with O. S. U. drawing tables (30" by 36" tops), a set of Schroeder models, a collection of shop drawings and facilities for blue-printing.

For Photography:—A well arranged and equipped dark-room, printing apparatus, copying camera, eight view cameras, lenses of long and short focus, telephotographic lens, color screens, shutters for instantaneous exposures and an excellent outfit for photo-micrography.

In addition to the above the library contains a well-selected collection of books pertaining to the work of the department.

4. **Specifications.** Lectures and practice in preparing Specifications for Architectural Structures. Two credit hours. (Course in Architecture, fourth year, second term, Tu. 11, W. 1-3.)

5. **Decoration and Ornament.** Lectures on the different styles of carved ornament and decorative color. The practice part of this subject will be incorporated in the Clay-Modeling and Designing. Three credit hours. (Course in Architecture, third year, first term, M. W. 9, F. 9-11.)

6. **Estimates and Superintendence.** Lectures and practice in preparing estimates for structures designed in Courses 11, 12, 13 and 21, and the duties of superintendence. Four credit hours. (Course in Architecture, fourth year, third term, M. W. 8, W. 1-5.)

7. **Heating, Ventilating and Plumbing.** Lectures and experimental work. Lectures on the principles and methods of heating and ventilating and of sanitary plumbing. Experimental work is carried on with the heating and ventilating plants in the different University buildings. Five credit hours. (Course in Architecture, fourth year, second term, M. W. F. 8, M. Tu. 1-3.)

9. **History of Architecture.** Lectures illustrated by lantern slides. Three credit hours. (Course in Architecture, second year, first term, M. W. F. 11.)

10. Continuation of 9. (Course in Architecture, second year, second term, M. W. F. 11.)

11. Continuation of 10. (Course in Architecture, second year, third term, M. W. F. 11.)

12. **Architectural Drawing.** Drawing architectural ornament, details of orders and styles, with the special object of impressing upon the student's mind the architectural characteristics considered in Course 9. Two credit hours. (Course in Architecture, second year, first term, W. Th. 2-4.)

13. Continuation of 12. (Course in Architecture, second year, second term, W. Th. 2-4.)

14. Continuation of 13. (Course in Architecture, second year, third term, W. Th. 2-4.)

15. **Designing.** Lectures and practice in designing structures adapted to modern requirements. Four credit hours. (Course in Architecture, third year, first term, W. Th. 1-4, F. 1-3.)

16. **Designing.** Lectures and practice. Two credit hours. (Course in Architecture, third year, second term, Th. F. 1-3.)

17. **Designing.** Lectures and practice. Four credit hours. (Course in Architecture, third year, third term, W. Th. 1-4, F. 1-3.)

18. **Designing.** Four credit hours. (Course in Architecture, fourth year, first term, Th. 10, W. Th. 1-4.)

19. **Designing.** Four credit hours. (Course in Architecture, fourth year, third term, Th. 11, Th. F. 1-4.)

20. **Thesis.** Original design to be accompanied with written description, specifications and estimate. Five credit hours. (Course in Architecture, fourth year, third term.)

21. **Architecture of Tall Skeleton-Constructed Buildings.** Two credit hours. (Course in Architecture, fourth year, second term, F. 10, 1-3.)

NEW ENGINEERING BUILDING FOR DEPARTMENTS OF ARCHITECTURE AND DRAWING AND CIVIL ENGINEERING

ASTRONOMY

Office, Emerson McMillin Observatory

Professor H. C. Lord, Mr. J. Warren Smith, Mr. B. F. Maag

The Emerson McMillin Observatory was founded in 1895 through the generosity of Mr. Emerson McMillin. The building and equipment were designed primarily for purposes of instruction. The main building contains, on the first floor, an office and library, an assistant's room, students' computing room, lecture room, comparator room, clock room and two observing rooms; on the second floor, the 25-foot dome and a large photographic dark-room; in the basement, a large and well-equipped instrument shop and a large spectroscopic laboratory. The remaining buildings consist of an especially designed theodolite house and the director's residence.

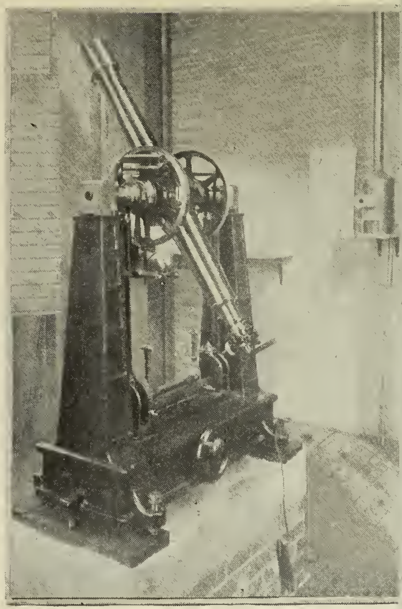
The equipment consists of a 12½ inch equatorial telescope, with mounting by Warner & Swasey and objective by Brashear, a universal star spectroscope by Brashear, position micrometer by Warner & Swasey, three-inch combined zenith telescope and transmit by Saegmuller, four-inch portable equatorial by Alvan Clark, two and one-half inch zenith telescope by Troughton & Simms, twelve-inch theodolite and two small theodolites by Troughton & Simms, comparator by Zeiss, five-foot concave grating spectroscope by Brashear, clock by Riefler, chronograph, chronometers, sextants, meteorological instruments, etc.

The spectroscopic laboratory is also provided with a two-horse power gas engine, a dynamo and a large storage battery.

2. **Astronomy, Geodosy and Least Squares.** Lectures on practical astronomy, supplemented by practice with the instruments of the Emerson McMillin Observatory. Three credit hours. (Course in Civil Engineering. Third year, first and second terms. Lecture M. W. F. 11. Laboratory hours to be arranged with the students.)

   Laboratory work entirely. Four credit hours. (Course in Civil Engineering, third year, third term.)

NOTE:—For additional courses see catalogue of the Arts College.



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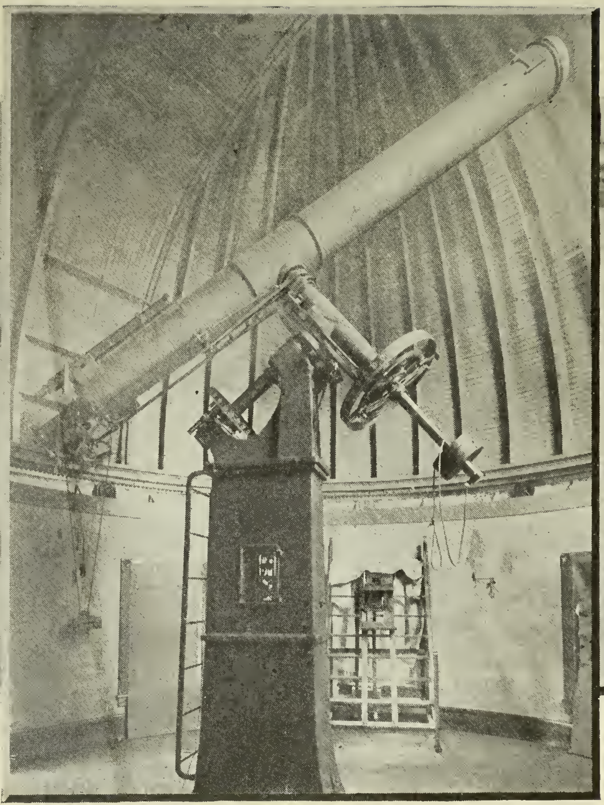

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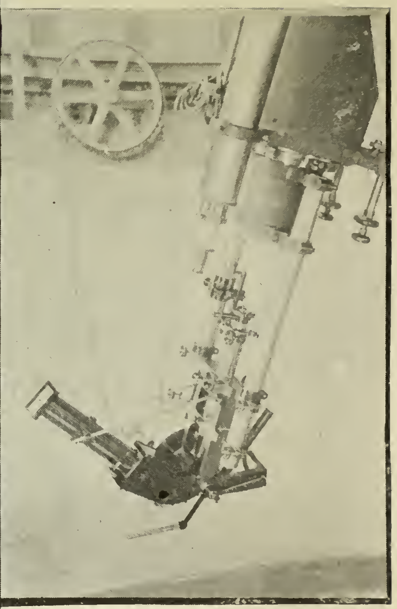


SPECTROSCOPE

CERAMICS

(DEPARTMENT OF CLAY WORKING AND CERAMICS)

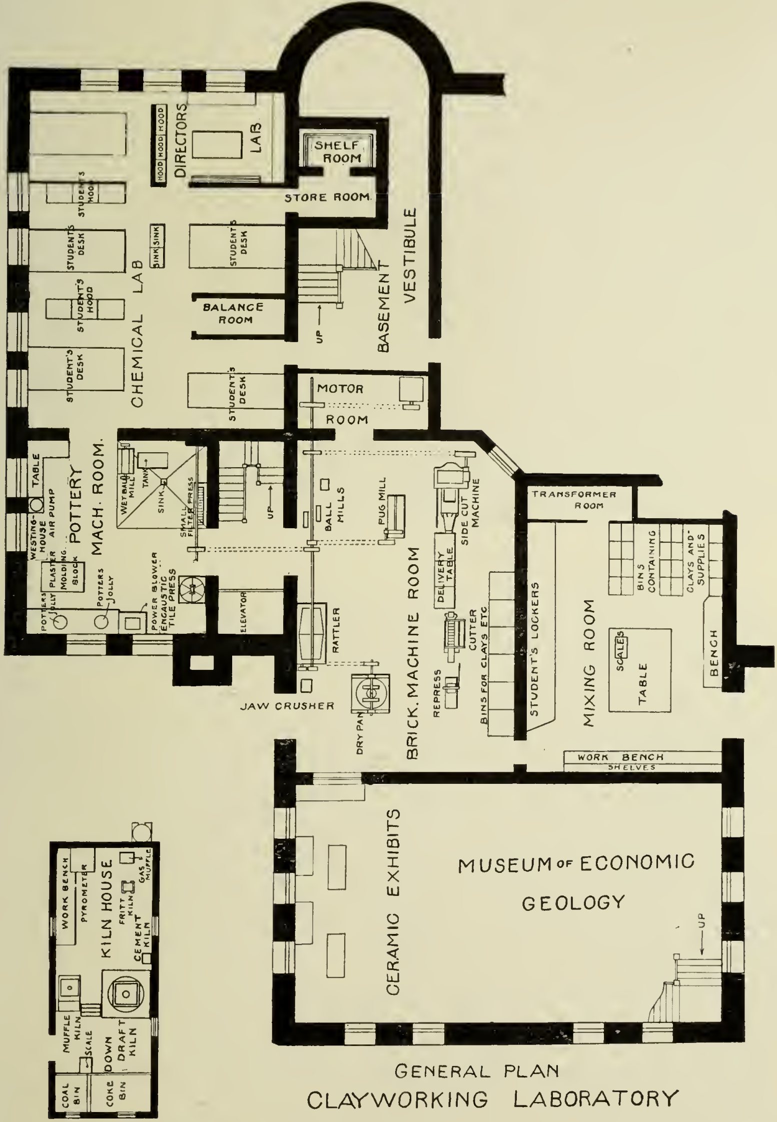
Office, Orton Hall, Room 4

Professor Edward Orton, Jr , Mr. Bleininger

The facilities of the Department for study in the field of clay working comprise: Ist. A convenient chemical laboratory, specially designed and equipped for the analysis and decomposition of silicates. Provision has been made for the use of hydrofluoric acid with safety, and the platinum ware has been made to order with this purpose in view. 2nd. A complete mechanical outfit for the preparation of clays for pottery manufacture and the production of the ware itself, of any grade from earthen wares to porcelain. The machinery is of the latest type and comprises all important varieties in use for grinding, tempering, washing, filtering and molding. 3d. A similar plant for the manufacture of brick, tiles, pipes and hollow goods. The machinery here is of full size and samples up to a ton in weight can be received and transformed into the finished articles by any or all of the standard methods in commercial use. The power for this purpose is derived from a fine electric motor, driven from the University power plant. 4th. A kiln house, equipped with a kiln in which several hundred bricks, or an equivalent quantity of sewer pipe, stoneware, or pottery can be burnt. The fuel is intended to be coke, except in special cases where the fuel available for burning clay wares is to be made the subject of test. There is also provided a crucible melting furnace and a muffle furnace for testing glazes. A muffle kiln of larger size for burning pottery, glazed ware and decorated wares has recently been put into operation. 5th. A ceramic museum, containing a collection of American pottery and clay products of every class, is in process of installation. 6th. A library of the best literature on the subject, mainly German, but containing a few English and French works, and the trade periodicals.

The facilities of the Department for study in the field of cement and mortar materials comprise in addition to the foregoing plant, much of which is especially well suited to this purpose, the following special apparatus: 1st. An improved dry-ball-mill, of chilled iron, for grinding the raw material together, and for grinding the cement clinker. 2d. A small cupola, fired with coke and using air blast, for the vitrification of the refractory silicates used. 3d. Access to the complete and well appointed cement testing laboratory of the Department of Civil Engineering.

These facilities permit the Department to offer exceptional opportunities to any who wish to specialize in this important field of manufacture.



GENERAL PLAN
CLAYWORKING LABORATORY

1. **Ceramic Chemistry** This course is open only to those who have completed General Chemistry 12. The student begins the quantitative analysis of salts and chemicals, and later works on limestone and other easy minerals. Five credit hours. (Course in Ceramics and Short Course in Clay-working, second year, first term, M. Tu. W. 1-4.)

2. Continuation of Course 1. The student begins the quantitative analysis of clays and complex minerals, working first on samples of known composition, and later on unknown materials. Five credit hours. (Course in Ceramics and Short Course in Clay-working, second year, second term, M. Tu. W. 1-4.)

3. Continuation of Course 2. The student completes the ultimate analysis of clays and begins the proximate or "Rational" analysis of clays and pottery bodies, following the methods of Seger. Five credit hours. (Course in Ceramics and Short Course in Clay-working, second year, third term, M. Tu. W. 1-4.)

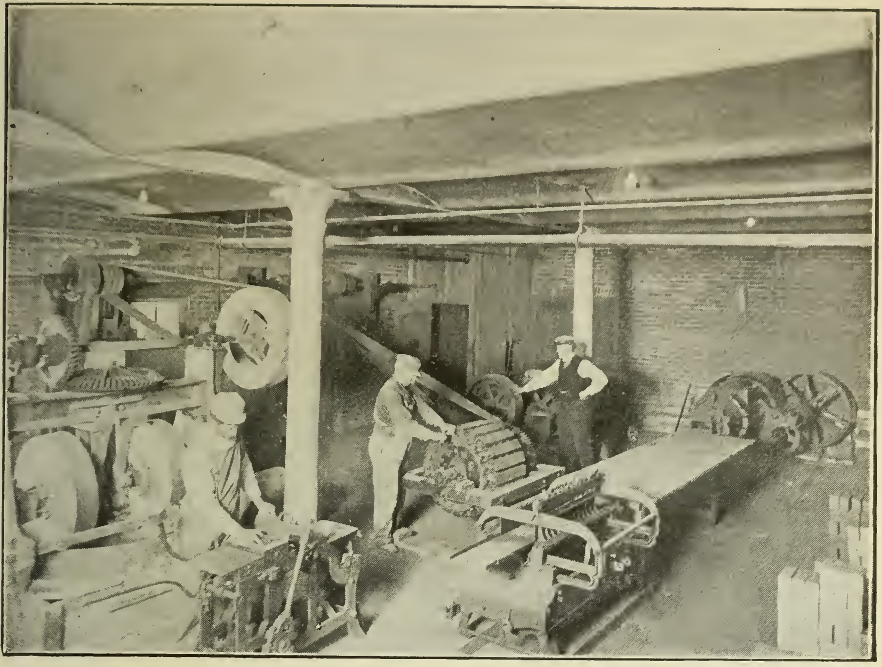
4. **Lectures on Clay Manufacture** (supplemented by frequent recitations). The origin, composition and properties of clays and other minerals employed in the clay, glass and cement industries. Five credit hours. (Course in Ceramics, third year, first term; Short Course in Clay-working, second year, first term, M. Tu. W. Th. F. 8.)

5. Continuation of Course 4. A series of lectures, with recitations, on the general principles of the manufacture of clay wares, including the selection and winning of the materials, their preparation and manufacture. Five credit hours. (Course in Ceramics, third year; Short Course in Clay-working, second year, second term, M. Tu. W. Th. F. 8.)

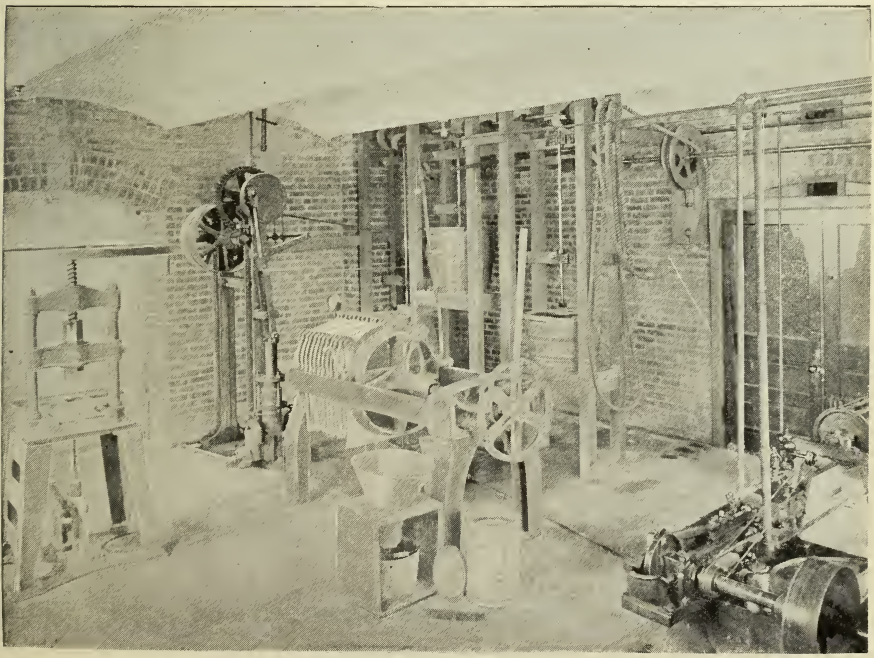
6. Continuation of Course 5. A series of lectures, with recitations, on the drying, burning, and decoration of claywares, including the preparation of coloring materials, glazes, etc. Five credit hours. (Course in Ceramics, third year; Short Course in Clay-working, second year, third term, M. Tu. W. Th. F. 8.)

7. **Ceramic Chemistry.** Continuation of Course 3. Open only to those who have completed that course. The analysis of glasses and glazes, devoting special attention to the use of hydrofluoric acid in silicate analysis, and to the determination of lead and boracic acid. Five credit hours. (Course in Ceramics, third year second term, M. Tu. W. 1-4.)

9. **Laboratory Work in Ceramics.** Open only to those who have completed Courses 3 and 6. The student will first practice the various methods of measurement of the physical properties of clays, and then will undertake the production of such wares as are made from single clays; then wares made by blending two or more natural clays; and, then, such wares as are made from an artificial body. In each case the bodies made will be burnt and tested. Five credit hours. (Course in Ceramics, fourth year, first term, W. Th. F. 1-4.)



BRICK-MAKING LABORATORY



POTTERY-MAKING LABORATORY

10. Continuation of Course 9. The student will practice on the production of glasses and glazes, beginning with the natural "slip glazes" and taking successively the soft raw-lead glazes, the fritted lead-boracic-acid glazes, and the hard-fire leadless porcelain glazes. In each case the glazes will be made for use on some definite body, and will be made to "fit." Five credit hours. (Course in Ceramics, fourth year, second term, W. Th. F. 1-4.)

11. Continuation of Course 10. The student will practice on the use of the coloring and opacifying oxides in glazes, and on the production of colors for the decoration of pottery, and of body stains. Five credit hours. (Course in Ceramics, fourth year, third term, M. F. 8-12, F. 1-3.)

12. **Lectures on Cement Manufacture.** The theory of hydraulicity, the compounding, manufacture and testing of natural and Portland cements and hydraulic silicates. Open to students who have had courses 3 and 6. Five credit hours. (Course in Ceramics, fourth year, second term, M. Tu. W. Th. F. 9.)

15. **Thesis.** See requirements for graduation, page 117.

16. **General Principles of Applied Ceramics.** A series of lectures on the chemical technology of the clay, glass and cement industries. Five credit hours. (Course in Chemical Engineering, fourth year, third term, M. Tu. W. Th. F. 11.)

17. **Practice** in making drawings and specifications for brick kilns, brick dryers, pottery kilns, gas producers, glass pot-furnaces, glass tanks, cement kilns and burning cylinders. Students will be allowed to specialize along the lines they intend to follow. Four credit hours. (Course in Ceramics, fourth year, second term, M. Tu. 1-5.)

18. **Laboratory Work on Cement Manufacture.** Training is given in the analysis of cement materials by the methods in technical use; in the preparation of minerals for cement; in the burning of cement; in the testing of the products, and in the investigation of the general problem of the cement manufacturer. Open to students who have had Ceramics (12). Five credit hours. (Alternative with Ceramics (11), Course in Ceramics, fourth year, third term, M. F. 8-12, F. 1-3.)

CHEMISTRY

Office, Chemical Hall, Room 20

Professor McPherson, Emeritus Professor Norton, Associate Professor Henderson, Associate Professor Foulk, Mr. Mumma, Mr. Webb, Miss Andrews, Mr. Coover.

The Department of Chemistry occupies the larger portion of Chemical Hall. The main lecture room is situated on the second floor, and has a seating capacity of one hundred and seventy-five persons. A smaller lecture room is situated on the first floor. There are six main laboratories; two for students in elementary chemistry and qualitative analysis, accommodating five hundred; one for the more advanced qualitative analysis and quantitative analysis, with desks for sixty-five; one for sanitary analysis and one for organic chemistry, each with accomodations for twenty; one for physical chemistry. In addition to these there is an office, two balance rooms, three private laboratories and several smaller rooms, used for combustion work, spectroscopic work and private investigations.

The laboratories are equipped with all the modern conveniences, as water, gas, steam ovens, drying ovens, automatic air blasts, electric lights, etc. Distilled water is piped from a large still in the attic to each room.

Each student has his own desk with drawers and locker. All supplies are obtained from the chemical store room, which is liberally supplied with all the materials and apparatus necessary for chemical investigation

The department is also well equipped with all apparatus necessary for experimentally illustrating the class room work. The main lecture room is furnished with cases which contain a large collection of specimens for purposes of illustration.

3. **Elementary Chemistry.** One hour lecture, one hour quiz and six hours laboratory work weekly. Five credit hours. (Short Course in Clay-working, first year; Short Course in Mining, second year; first term, lect. M. 8, quiz Th. 10, lab. Tu. W. 1-4; second term, lect. M. 3; quiz Th. 10, lab. Tu. W. 1-4.)

7. **Elementary Chemistry.** Inorganic. Lectures, laboratory and quiz. Laboratory work; first term, experiments upon the non-metals; second term, experiments upon the metals. Five credit hours. (All four-year courses, first year, first and second terms, lect. M. 8 or 3; quiz, F. 9, 10, 1 or 3; lab. M. Tu. 9-12; Th. F. 9-12; Th. F. 1-4; or W. 8-10, S. 8-12.)

8. **Organic Chemistry.** One lecture, one quiz, six hours of laboratory work weekly. Five credit hours. (Course in Chemical Engineering, third year, first term, Tu. Th. 10; M. Tu. 1-4.)

9. **Organic Chemistry.** Five credit hours. (Course in Chemical Engineering, third year, second term, Tu. Th. 10; lab. Th. F. 1-4. Option, third term, same hours.)

12. **Qualitative Analysis.** Four credit hours. (All four-year courses, first year, third term. For hours see Course 7, omitting lecture.)

12*a*. **Qualitative Analysis.** Five credit hours. (Course in Clay-working, first year, third term, F. 9, W. 8-10, F. 1-4, S. 8-11.)

15. **Sanitary Chemistry.** Lectures and laboratory. A study of the most important chemical methods for the analysis of water. Four credit hours. (Course in Chemical Engineering, fourth year, third term, Tu. Th. 10, F. 1-5.)

17. **Inorganic Preparations.** Four credit hours. (Third term elective. Laboratory work, afternoons.)

20. **Quantitative Analysis.** Laboratory, lectures and recitations. This course is designed to give the student a knowledge of the first principles of gravimetric and volumetric analysis. Four credit hours. The course should be accompanied by Courses 21 and 31. (Course in Chemical Engineering, second year, first, second and third terms, M. Tu. 1-4, W. 1-3.) (Course in Manual training, third year, option.)

21. **Advanced General Chemistry.** Lectures and recitations. This course consists of a rapid review of the fundamental physical and chemical laws relating to chemistry, followed by a thorough study of the principles of general inorganic chemistry. Two credit hours. (Course in Chemical Engineering, second year; option, Course in Manual Training, third year; first, second and third terms, Tu. Th. 9.)

30. **Physical Chemistry.** Lectures and recitations. This course aims to give the student such a general knowledge of physical chemistry as may be obtained by a thorough study of some one of the standard texts on the subject. Three credit hours. (Course in Chemical Engineering, fourth year, second and third terms, M. W. F. 8.)

31. **Stoichiometry.** Recitations. Drill in solution of chemical problems. Two credit hours. (Course in Chemical Engineering, second year, first term, Tu. Th. 11.)

32. **Industrial Chemistry.** Laboratory and lectures. Four credit hours. (Course in Chemical Engineering, fourth year, first term, Tu. F. 10, W. F. 1-3; second term, Tu. Th. 10, W. F. 1-3.)

5. **Rare Elements.** Lectures and recitations. This course is designed to serve two purposes. It extends the student's knowledge of chemical facts and principles by a study of those elements usually passed by with brief comment in general courses. It is of considerable practical value to students of metallurgy, since many of the rarer metals are now frequently met with in the metallurgical industries, and the analyst must be familiar with their properties. Three credit hours. (Option, Course in Chemical Engineering, fourth year, first term, M. W. F. 9.)

CHEMICAL LECTURE ROOM

CIVIL ENGINEERING

Office, Hayes Hall, Room 13

Professor Sherman, *Professor Heller*, *Associate Professor Eno*, *Mr. Bruning*, *Mr. Davies*

The department occupies the east and west wings of the second floor and two basement rooms in Hayes Hall. The large and well lighted room of the east wing, 38 feet by 47 feet, is equipped with 50 drawing tables and is used by the department drawing classes. A large case of drawers filled with shop drawings, working drawings and maps, gathered from practicing engineers, is open to students for study and consultation. These drawings lay before them good examples of engineering practice. A considerable outfit of office drawing instruments is provided for those students requiring them in special work. This includes long steel straight edges, large triangles, parallel rulers, protractors, section liners, planimeter, pantograph, etc.

In the west wing are the instrument and blue print rooms, and the recitation room, equipped with electric lantern. The instruments for instruction in surveying include one high grade transit, ten other transits fitted for various kinds of surveying, five leveling instruments, solar compass, solar attachments for two transits, two high grade aneroid barometers, rods, chains, tape lines, hand-levels, two current-meters for measuring flow of water in streams. There is also a complete camp outfit for the summer field work in surveying.

The blue print room has three large frames and abundant facilities for preparing paper and washing prints.

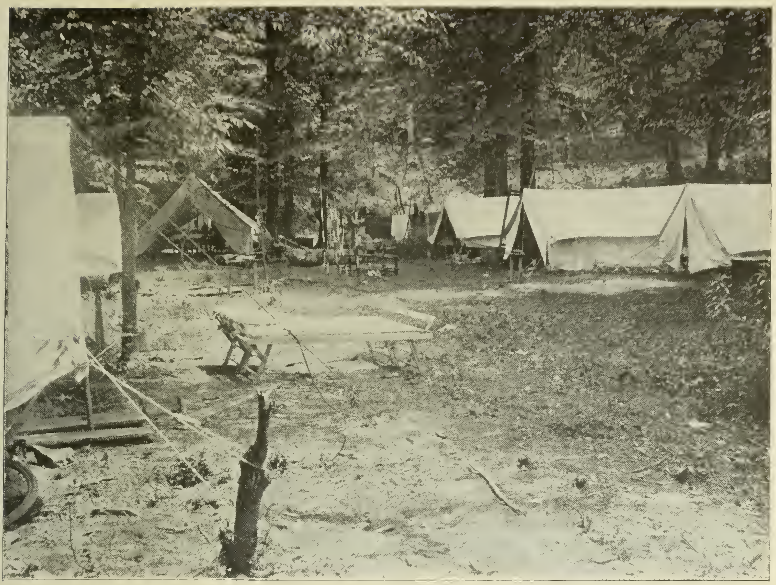
There is a collection of models for illustration of bridge- and roof-trusses and of problems in stereotomy. Numerous photographs of bridges and other engineering structures are included.

The basement rooms are equipped for cement testing with two testing machines, a Boehme hammer, briquette molds, sieves, hot test apparatus, etc.

The department has, for rating current-meters, an excellent course 175 feet long in one side of the reservoir belonging to the University Power Plant.

1. **Land Surveying.** Recitations and field work. Johnson's Theory and Practice of Surveying. Six credit hours. (Course in Civil Engineering, second year, first term, M. Tu. W. Th. F. 1, M. 2-4; or M. Tu. W. Th. F. 11, Tu. 2-4; or M. Tu. W. Th. F. 1; W. 2-4.)

2. **Railroad Surveying.** Recitations and field work. Searle's Field Engineering and Crandall's Transition Curve. Six credit hours. (Course in Civil Engineering, second year, third term, M. Tu. W. Th. F. 1, M. 2-4; or M. Tu. W. Th. F. 11, Tu. 2-4; or M. Tu. W. Th. F. 1, W. 2-4.)



SUMMER CAMP OF 1900

CLASS IN SURVEYING

3. **Topographical Surveying.** Lectures, field work and drawing. Johnson's Surveying used for reference. Four credit hours. (Course in Civil Engineering, third year, first term, M. Th. 10, S. 8-12; or Tu. F. 10, S. 8-12.)

4. **Topographical Drawing.** Platting, pen and tinted work. Reed's Topographical Drawing and Sketching. Four credit hours. (Course in Civil Engineering, second year, second term, M. Tu. 1-4, W. 1-3; or Th. F. 2-4, S. 8-12.)

6. **Stereotomy.** Recitations, drawing and model cutting. Warren's Stereotomy. Four credit hours. (Courses in Architecture and Civil Engineering, third year, second term, M. Th. 10, S. 8-12; or Tu. F. 10, S. 8-12.)

7. **Bridge Stresses.** Recitations and lectures. Part I of Dubois's Stresses in Framed Structures. Five credit hours. (Course in Civil Engineering, third year, third term, M. Tu. W. Th. F. 8 or 9.)

8. **Bridge Designing.** Lectures and drawings. Part II of Dubois's Stresses in Framed Structures and Johnson's Modern Framed Structures used for reference. Five credit hours. (Course in Civil Engineering, fourth year, first term, M. Tu. W. Th. F. 8.)

10. **Sanitary Engineering.** Recitations and lectures. Folwell's Sewerage. Five credit hours. (Course in Civil Engineering, fourth year, third term, M. Tu. W. Th. F. 11.)

14. **Civil Engineering Laboratory.** Cement testing. Two credit hours. (Course in Civil Engineering, fourth year, second term, M. 1-5; or Tu. 1-5.)

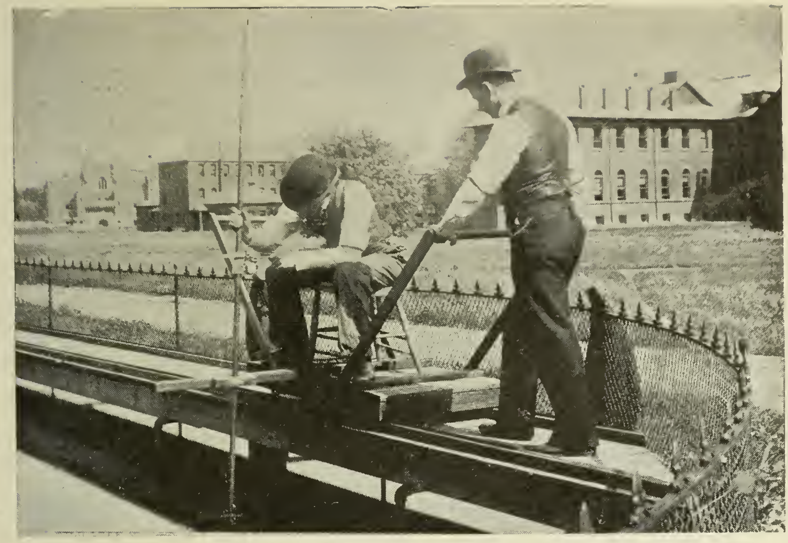
15. **Masonry Construction.** Recitations and lectures. Baker's Masonry Construction. Five credit hours. (Courses in Architecture and Civil Engineering, fourth year, first term, M. Tu. W. Th. F. 9.)

16. **Highways.** Recitations and lectures. Byrne's Highway Construction. Five credit hours. (Course in Civil Engineering, third year, first term, M. Tu. W. Th. F. 8 or 9.)

17. **Railway Location.** Recitations and lectures. Wellington's Economic Theory of Railway Location. Five credit hours. (Course in Civil Engineering, fourth year, second term, M. Tu. W. Th. F. 9.)

18. **Water Supply.** Recitations and lectures. Folwell's Water-Supply Engineering. Five times a week. (Course in Civil Engineering, fourth year, third term, M. Tu. W. Th. F. 8.)

19. **Trusses.** Lectures and drawings. Five credit hours. (Courses in Architecture, Mining and Mechanical Engineering, third year, third term, M. Tu. Th. F. 10, W. 2; or M. Tu. W. Th. F. 11.)



RATING CURRENT METER

MAKING CROSS SECTION OF RIVER BED

21. **Surveying.** Recitations and field work. Bruce and Ketchum's Manual. Three credit hours. (Courses in Architecture and Industrial Arts, fourth year, third term, M. W. F. 9.)

22. **Summer Course in Field Work.** The students are taken into camp in a rough, broken country and given a thorough drill in land and elementary railroad surveying. The course begins the Friday before Commencement Day, and continues four weeks of six days per week, ten hours per day. The work of the student and the discipline of the camp is in the hands of competent instructors. This course must be preceded by Courses 1, 2 and 4. Students conditioned on any of these courses may be admitted at discretion of instructor in charge. (At conclusion of second year of Course in Civil Engineering.)

23. **Summer Course in Field Work.** Similar to Course 22. Students work on advanced railroad surveying and topographical surveying. This course must be preceded by Courses 3, 22 and 24. Students conditioned in any of these courses may be admitted at discretion of instructor. (At conclusion of third year of Course in Civil Engineering.)

24. **Drawing of Engineering Structures.** Five credit hours. (Course in Civil Engineering, third year, second term, M. Tu. 1-5, W. 1-3; or W. 3-5, Th. F. 1-5.)

25. **Advanced Bridge Work.** Draw-spans, continuous girders, steel arches, etc. Five credit hours. (Option, Course in Civil Engineering, fourth year, second term, M. Tu. W. Th. F. 8.)

26. **Steel Construction.** Steel skeleton construction for tall buildings. Three credit hours. (Course in Architecture, fourth year, second term, M. W. F. 9.)

SUMMER CAMP OF 1902

DRAWING

(DEPARTMENT OF ARCHITECTURE AND DRAWING)

Office, Hayes Hall, Room 23 or 27

Professor Bradford, Associate Professor French, Mr. Lewis, Mr. Martin
Mr. Vosskuehler, Mr. Tidball

2. **Lettering.** Practice and occasional lectures. Three credit hours. (Short Course in Industrial Arts, first year; Short Course in Mining, second year, first term, Th. F. 1-4. Must be accompanied or preceded by 24, or 27.)

5. **Technical Drawing.** Rules and methods for making working drawings in machine design to represent correctly form and dimensions for shop use, and for tracing and blue-printing the same. This course must be preceded by Course 35. Three credit hours. (Courses in Electrical and Mechanical Engineering, Industrial Arts and Manual Training, third year, first term, Th. F. 1-4.)

7. **Photography.** Lectures: Optics of photography, chemistry of photography, exposing and developing, printing, lantern slides, orthochromatic photography and some of the applications of photography. Practice: Outdoor, interior, instantaneous and flashlight photography, copying, lantern slides and printing. Two credit hours. (Course in Architecture, third year, first term, M. Tu. 1-3; Courses in Civil and Mechanical Engineering, third year; Courses in Ceramics and Mining Engineering, fourth year, third term, M. Tu. 1-3; or Th. F. 1-3.)

11. **Mechanical Drawing.** Lectures and practice. Five credit hours. (Course in Clay-working, second year, third term, W. 9, Th. F. 1-5.)

14. **Pen Drawing.** Must be preceded by Course 28. Two credit hours. (Course in Architecture, second year, first term, M. Tu. 2-4.)

18. **Water Color Painting.** Must be preceded by Course 28. Three credit hours. (Course in Architecture, fourth year, second term, Tu. Th. 8-11.)

19. **Water Color Painting.** Must be preceded by Course 18. Two credit hours. (Course in Architecture, fourth year, third term, Tu. Th. 8-10.)

21. **Technical Drawing.** Must be preceded by Course 34. Two credit hours. (Course in Chemical Engineering, third year, first term, Tu. Th. 8-10.)

MECHANICAL DRAWING ROOM
FREE HAND DRAWING ROOM

22. **Technical Drawing.** Must be preceded by Course 21. Two credit hours. (Course in Chemical Engineering, third year, second term, W. Th. 1-3.)

23. **Technical Drawing.** Must be preceded by Course 22. Two credit hours. (Course in Chemical Engineering, third year, third term, M. Tu. 1-3.)

24. **Free Hand Drawing.** Pencil drawing from models and plaster casts. Practice and occasional lectures. One credit hour. (Short Course in Industrial Arts, first year, first term, W. 1-3, or S. 8-10.)

25. **Free Hand Drawing.** Charcoal from models and plaster casts. Practice and occasional lectures. Must be preceded by Course 24. One credit hour. (Short Course in Industrial Arts, first year, second term, W. 1-3, or S. 8-10.)

26. **Free Hand Drawing.** Charcoal from plaster casts and still-life. Practice and occasional lectures. Must be preceded by 25. One credit hour. (Short Course in Industrial Arts, first year third term, W. 1-3.)

27. **Free Hand Drawing.** Pencil drawing from models and plaster casts. Practice and occasional lectures. Two credit hours. (All Four-Year Courses, first year, first term, M. W. 8-10; M. Tu. 10-12; M. Tu. 1-3; M. F. 1-3; Th. F. 10-12; Th. F. 1-3; W. F. 8-10; W. 1-3, S. 8-10; or Tu. Th. 1-3. Course in Clay-working, second year, second term, Th. F. 1-3.)

28. **Free Hand Drawing.** Charcoal drawing from plaster casts and still-life. Practice and occasional lectures. Must be preceded by Course 27. Two credit hours. (All Four-Year Courses, first year, second term, schedule as in Course 27.)

32. **Lettering.** Practice and occasional lectures. This course must be preceded or accompanied by Course 27. Three credit hours. (All Four-Year Courses, first year, third term, W. F. S. 8-10; W. F. 8-10, S. 10-12; M. 8-10, S. 8-12; M. W. 8-10, S. 10-12; M. Tu 1-4; or W. F. 1-4.)

33. **Projection Drawing.** Lectures and practice. Orthographic, isometric and oblique projections, and elementary working drawings. This course must be preceded by Course 32. Three credit hours. (Second year, first term.)

Lectures.	Practice.	Course in
M. 8	Tu. Th. 9-11	Architecture.
W. 11	M. F. 10-12	Ceramics.
W. 11	M. F. 10-12	Chemical Engineering.
M. 8	Tu. Th. 9-11	Civil Engineering.
Th. 11	M. F. 10-12	Electrical Engineering.
W. 11	M. F. 10-12	Industrial Arts.
W. 11	M. F. 10-12	Manual Training.
W. 11	M. F. 10-12	Mechanical Engineering.
Tu. 11	Tu. Th. 9-11	Mining Engineering.

MODELING ROOM

PHOTOGRAPHIC LABORATORY

34. **Descriptive Geometry.** Lectures and practice. This course must be preceded by 33. Three credit hours. (Second year, second term.)

Lectures.	Practice.	Course in
M. W. 11	F. 10-12	Ceramics.
Tu. Th. 11	F. 10-12	Chemical Engineering.
Tu. Th. 11	F. 10-12	Electrical Engineering.
M. W. 11	F. 10-12	Industrial Arts.
Tu. Th. 11	F. 10-12	Manual Training.
M. W. 11	F. 10-12	Mechanical Engineering.
Tu. Th. 11	Tu. 9-11; or F. 10-12	Mining Engineering.
M. W. 8	Th. 9-11	Short Industrial Arts.

35. **Shades, Shadows and Perspective.** Three credit hours. (Second year, third term.)

Lectures.	Practice.	Course in
W. 11	M. F. 10-12	Ceramics.
Tu. 8	Tu. Th. 9-11	Civil Engineering.
Th. 11	M. F. 10-12	Electrical Engineering.
W. 11	M. F. 10-12	Industrial Arts.
W. 11	M. F. 10-12	Manual Training.
W. 11	M. F. 10-12	Mechanical Engineering.
Tu. 11	Tu. Th. 9-11	Mining Engineering.
M. 8	Tu. Th. 9-11	Short Industrial Arts.

36. **Descriptive Geometry.** Five credit hours. (Courses in Architecture and Civil Engineering, second year, second term, M. W. 8, Tu. Th. 8-11.)

37. **Architectural Perspective and Shades and Shadows.** Lectures and practice. This course must be preceded by Course 36. Five credit hours. (Course in Architecture, second year, third term, M. W. 8, Tu. Th. 8-11.)

38. **Projection Drawing.** Lectures and practice. Orthographic, isometric and oblique projections and intersections. This course must be preceded by Course 2. Three credit hours. (Short Course in Industrial Arts, first year; Short Course in Mining, second year; second term, Th. F. 1-4.)

39. **Draughting and Blue-Printing.** Practice and occasional lectures. This course must be preceded by Course 38. Three credit hours. (Short Course in Industrial Arts, first year; Short Course in Mining, second year; third term, Th. F. 1-4.)

40. **Clay Modeling.** Modeling in clay, ornamental forms from plaster casts, photographs, and nature. This course must be preceded by Course 28. Two credit hours. (Course in Architecture, third year, second term, M. Tu. 1-3.)

41. **Clay Modeling.** Continuation of Course 40. Modeling in clay and wax from photographs, nature and original designs. Casts made in plaster and gelatine moulds. This course must be preceded by Course 40. (Course in Architecture, third year, third term, M. Tu. 1-3.)

ECONOMICS AND SOCIOLOGY

Office, University Hall, Room 18.

Professor Clark, Assistant Professor Hagerty

Course 1 should precede all other courses except 2, 3 and 4.

1. **Elements of Political Economy.** Text-book, lectures and individual investigations. A careful study of the laws of production, exchange, distribution and consumption of wealth; combined with an analysis of the industrial actions of men as regards land, labor, capital, money, credit, rent, interest, wages, etc. Three credit hours. (Course in Industrial Arts, third year, first, second and third terms, M. W. F. 8.)
2. **Industrial Society.** A study of industry and industrial classes from Eleventh Century to the present time. Three credit hours. (Course in Industrial Arts, second year, first term, M. W. F. 9.)
3. **Industrial and Financial History.** This course deals especially with conditions prevailing in the United States since the Civil War. Three credit hours. (Course in Industrial Arts, second year, second term, M. W. F. 9.)
4. **Transportation Problems.** Lecture. A study of the development and present economic status of roads, canals and railroads in their relation to industry and to the state. Three credit hours. (Course in Industrial Arts, second year, third term, M. W. F. 9.)
5. **Immigration and Money.** Two credit hours. (Course in Industrial Arts, fourth year, first term, Tu. Th. 9.)
6. **Railroads, Crisis, Tariff.** Two credit hours. (Course in Industrial Arts, fourth year, second term, Tu. Th. 9.)
7. **Labor and Capital.** Two credit hours. (Course in Industrial Arts, fourth year, third term, Tu. Th. 9.)

EDUCATION

Office, University Hall, Room 54.

Associate Professor Major Dr. Haines

1. **Educational Psychology.** A thorough study of laws and principles selected from psychological literature on educational theory and practice. The function of psychology in determining the selection and arrangement of school studies and its bearing on class room procedure. James' Talks on Psychology supplemented by references to standard texts and to periodicals on psychology and education. Three credit hours. (Course in Manual Training, second year, first, second and third terms, M. W. F. 11.)

5. **Science of Education.** The foundations of educational theory; especially intended for the student who expects to deal with the larger problems of education, which confront superintendent or principal. This intelligent grasp of the fundamental problems of education all teachers should have, to make them masters of their art. Lectures, required readings and reports. Three credit hours. (Course in Manual Training, fourth year, first, second and third terms, M. W. F. 11.)

ELECTRICAL ENGINEERING

Office, Electrical Building, Room 8

Professor Caldwell, Assistant Professor Fish, Mr. Brooks

This Department has excellent facilities for practical experimental work with dynamo machinery and other electrical apparatus. The elementary electrical testing is provided for in the Physical Department which permits this Department to devote its time to engineering apparatus proper. The dynamo equipment consists of twenty-three machines of various makes and sizes from 40-H. P. down, aggregating over 250 horse-power. These include 110 and 500 volt direct and alternating current generators, polyphase motors, arc and incandescent lighting generators, railway and stationary motors, three rotary converters specially designed for experimental work, and a unipolar dynamo. The latter, with an alternating current generator, a 2-phase motor and one of the rotary converters were built by the students, it being the policy of the Department to build much of its apparatus. There are also a number of transformers of different makes, including one for welding, one for very high voltage and six of special design for testing. Arc lamps of different styles, a 10 kilowatt-hour storage battery, condensers, resistances, circuit breakers, and apparatus for magnetic-testing, illumination testing and photometric work also form part of the equipment. The measuring instruments include a standard Weston voltmeter with standard resistances and cells, besides over thirty-five other voltmeters and ammeters, mostly Weston's, and three wattmeters. There is a telephone laboratory with apparatus for comparative tests, a variety of transmitters and receivers, lines running to another building, and material illustrative of switch-board practice.

Power for running the dynamo laboratory is supplied from the University Power Plant by five induction motors and two synchronous motors or converters. There is also a well selected and growing collection of photographs, blue-prints, and material illustrative of electrical manufacture. The library of the Department is on the second floor and is especially valuable on account of the completeness of its sets of periodicals and transactions.

The University Power Plant (see page 102) is of great value as illustrative of a model installation. This plant has been largely installed by students who receive pay for such work.

There is a machine shop and a machinist who gives half his time to construction and repair work.

Columbus and neighboring towns have many electric plants of different systems which welcome visiting students. It is also usual to make an inspection trip to one or more of the cities of the State to visit manufacturing establishments and other points of electrical interest.

The Electrical Hall was built in 1889 by a special appropriation of the Legislature, and is occupied entirely by the Department of Electrical Engineering. It is a two-story brick building about seventy-five by forty-five feet. In the first floor sixty feet are taken up by the dynamo room, the full width of the building. The remainder of the floor is occupied with an office and apparatus room, a shop, a dark room for photography and a calibrating room arranged for the accurate and easy standardization of the instruments used in the laboratory. On the second floor are a lecture and draughting room forty-five by thirty feet, a reading room and library, office, photometric, magnetic and telephone laboratories, locker room and janitor's room. The building and its equipments are valued at about twenty thousand dollars.

6. **Electrical Engineering.** Lectures on direct and alternating circuits, dynamo machinery, transformers, accumulators and their applications. Two credit hours. (Course in Architecture third year; Courses in Civil, Mechanical and Mining Engineering, Industrial Arts and Manual Training, fourth year, first and second terms; Course in Chemical Engineering, fourth year, first term. M. Th. 10.)

7. **Electrical Engineering.** Laboratory work on the subjects treated in Course 6, which it accompanies. Two credit hours. Fourth year.

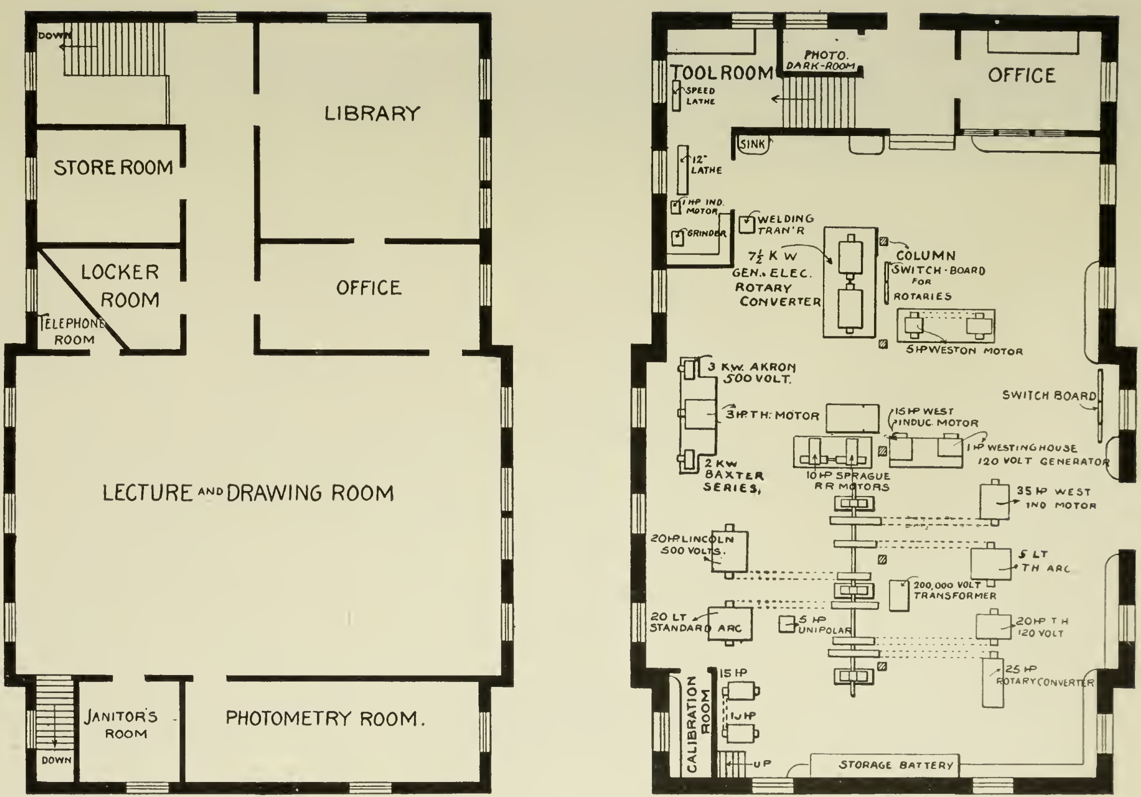
First term—S. 8-12. Course in Chemical Engineering.
W. 1-5. Course in Industrial Arts.
W. 1-5. Course in Manual Training.
W. or F. 1-5. Course in Mechanical Engineering.
M. 1-5. Course in Mining Engineering.

Second term—M. or W. 1-5. Course in Civil Engineering.
F. 1-5. Course in Industrial Arts.
F. 1-5. Course in Manual Training.
F. 1-5 or S. 8-12. Course in Mechanical Eng.
W. 1-5. Course in Mining Engineering.
(Course in Architecture, third year, second term, W. 1-5.)

8. **Direct Current Dynamo Machinery.** Generators and motors, their theory, construction and operation. Lectures, recitations and problems. Four credit hours. (Course in Electrical Engineering, third year, second term, M. Tu. Th. F. 9.)

9. **Elementary Dynamo Laboratory.** Handling and testing of circuits, generators, motors, etc. Four credit hours. (Course in Electrical Engineering, third year, third term, W. Th. 1-5; or F. 1-5, S. 8-12.)

10. **Alternating Current Circuits and Machinery.** Generators, transformers, single and polyphase motors, apparatus and systems. Lectures, recitations and problems. Three credit hours. (Course in Electrical Engineering, fourth year; first term, M. W. F. 11; second term, M. W. F. 8.)



SECOND FLOOR PLAN

FIRST FLOOR PLAN

ELECTRICAL LABORATORY.

11. **Advanced Dynamo Laboratory.** Continuation of the work begun in Course 9, together with alternate current apparatus, telephone apparatus, accumulators, lamps, etc. Three credit hours. (Course in Electrical Engineering, fourth year; first term, Tu. Th. 10-5; second term, Tu. Th. 10-5; third term, M. T. 1-4.)

12. **Electrical Transmission and Distribution.** Systems, operation and apparatus. Two credit hours. (Course in Electrical Engineering, fourth year, second term, Tu. Th. 8.)

13. **Application of Electricity.** Brief treatment of the elements of lumination, street railway work, telephone, telegraph, electro-metallurgy, mining, etc. The seminary method is used in this course to the extent of each student writing one paper on some assigned subject, and reading the same before the class. Five credit hours. (Course in Electrical Engineering, fourth year, third term, M. Tu. W. Th. F. 8.)

14. **Electrical Design.** Includes wiring of buildings, direct and alternate current generators, transformers, distribution, etc. Four credit hours. (Course in Electrical Engineering, fourth year; second term, M. Tu. 1-4, W. 1-3; third term, W. 1-3, Th. F. 1-4.)

FRENCH

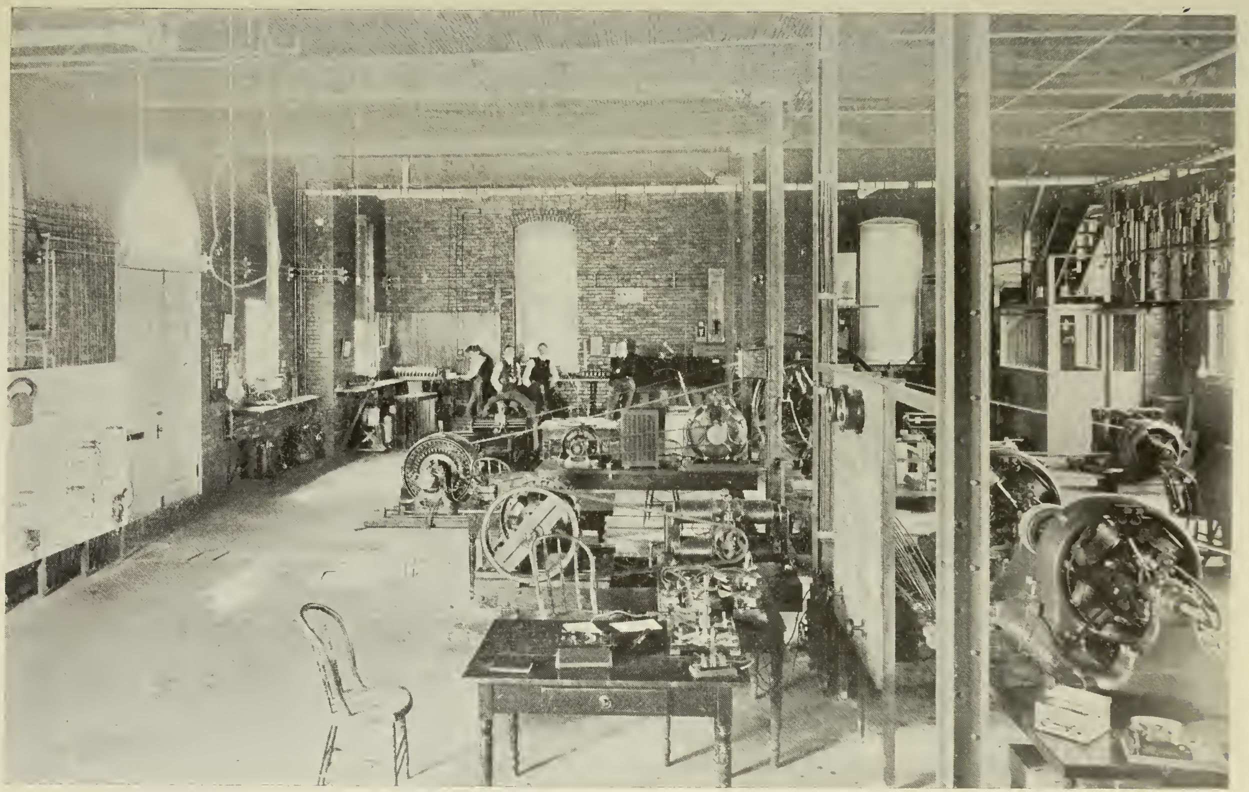
(DEPARTMENT OF ROMANCE LANGUAGES AND LITERATURES)

Office, University Hall, Room 35

Professor Bowen, Associate Professor Bruce, Assistant Professor Batchelder, Miss De Nagy

1. **Elementary French.** Grammar and reader, modern prose and plays. Four credit hours. (First, second and third terms. M. Tu. Th. F. 10 or 11; or Tu. W. Th. F. 2 or 3. Required of all students who offer partial credit in French as their entrance language. Offered as alternative with German 1 and Spanish 1 to those who enter with full or partial credit in Latin or Greek, or without previous language training.)

3. **Science Reading.** Four credit hours. (First, second and third terms. M. Tu. W. Th. 9. Open to those who have completed Course 1, or its equivalent. Required of all students who offer French as their entrance language.)



ELECTRICAL LABORATORY

GEOLOGY

Office, Orton Hall, Room 1

Professor Prosser, Professor Bownocker

The University is able to present unusual advantages for the study of Geology. By an act of the Legislature it has been put in possession of all the collections made by the late geological survey, and these collections have been supplemented by valuable additions of fossils and minerals from various sources. The State collection embraces a very complete representation of every geological formation shown in Ohio. In its new and ample quarters the Department offers exceptionally good opportunities for work in the lithological and stratigraphical laboratories.

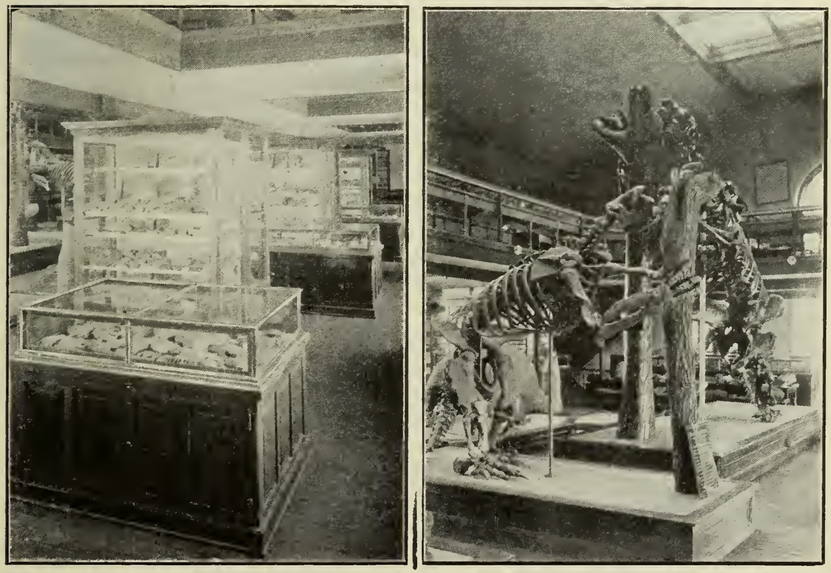
Orton Hall, completed at a cost of more than $100,000, is designed for the permanent accommodation of the large geological collection of the University and for work and instruction in the Department of Geology. A portion of it is occupied by the library and reading room. The building is two stories in height, with a high basement, is built of brick and faced with sandstone, and is fire-proof throughout. Some of the material was contributed by various quarries of the State of Ohio, and almost all of the finer varieties of Ohio building stone are represented in the columns, walls and ceiling panels of the vestibule. At the right of the main entrance is the geological lecture room and professor's private room. The central and rear portion is occupied by the geological and paleontological museums, while the museum of economic geology is in the basement. The laboratories of lithological and stratigraphical geology are on the second floor.

1. **Physiography.** The topographic features of the earth's surface and the agencies producing these. The atmosphere, climate, etc. Oceans, rivers, and lakes. Recitations, lectures, map work. Five credit hours. (Short Courses in Mining and Clay Working, first year; Short Course in Industrial Arts, second year, third term, M. Tu. W. Th. F. 11.)

2. **General Geology.** Structural, historical and dynamical geology. Four hours lectures and recitations, and two hours laboratory and field work. In the laboratory Dana's Manual of Geology, the Ohio Geological Reports and characteristic fossils will be studied. In the field, specimens will be collected, sections measured, formations identified and the student given an idea of the methods of work pursued by a field geologist. Field trips, mainly on Saturdays. Five credit hours. (Courses in Architecture, Ceramics, Civil and Mining Engineering, fourth year; Short Course in Clay-Working, second year, first term, M. Tu. W. Th. F. 11.)

4. **Elementary Geology.** Lithological, dynamical, structural and historical geology. Recitations, lectures, laboratory work. Five credit hours. (Short Course in Mining, second year, second term, M. Tu. W. Th. F. 9.)

GEOLOGICAL MUSEUM VIEWS



6. **Economic Geology.** Lectures and assigned reading. The nature of ores, their classification and origin. The metals of the United States, their distribution, abundance, modes of occurrence and origin. The non-metals, coal, oil, gas, clay, lime, cement, building stone, etc. In the discussion of the non-metals emphasis will be laid on the products of Ohio. Three credit hours. (Courses in Architecture, Ceramics, Civil and Mining Engineering, fourth year; Short Course in Clay-Working, second year, second term, M. W. F. 11.)

7. **Petrography.** Lectures and laboratory work. The igneous, sedimentary, and metamorphic rocks,—their origin and classification. The volcanic rocks of the Western United States,—their composition, structure and alteration products. The object of this course is to give the student a practical acquaintance with rocks. Two credit hours. (Course in Mining Engineering, fourth year, second term, Tu. 9-11; Th. 9.)

GERMAN

(DEPARTMENT OF GERMANIC LANGUAGES AND LITERATURES)

Office, University Hall, Room 30

**Professor Eggers, Associate Professor Mesloh, Mr. Eisenlohr, Miss Barrows*

1. **Elementary German.** Four credit hours. (First, second and third terms. M. Tu. Th. F. 10 or 11; or Tu. W. Th. F. 2 or 3. Required of all students who offer partial credit in German as their entrance language. Offered as alternative with French 1 and Spanish 1 to all students who enter with full or partial credit in Latin or Greek, or without previous language training.)

2. **Science Reading.** Four credit hours. (First, second and third terms. M. Tu. W. Th. 8. Open to those who have completed Course 1 or its equivalent. Required of all students who offer German as their entrance language.)

GYMNASIUM

(DEPARTMENT OF PHYSICAL EDUCATION)

Office, Gymnasium

Professor Linhart, Mr. Huddleson

The Gymnasium is a large modern building, completed in 1898. The basement is used for lockers, dressing rooms and baths. The east end is used by the young women, the west end by the young men. Each end has separate shower and plunge baths.

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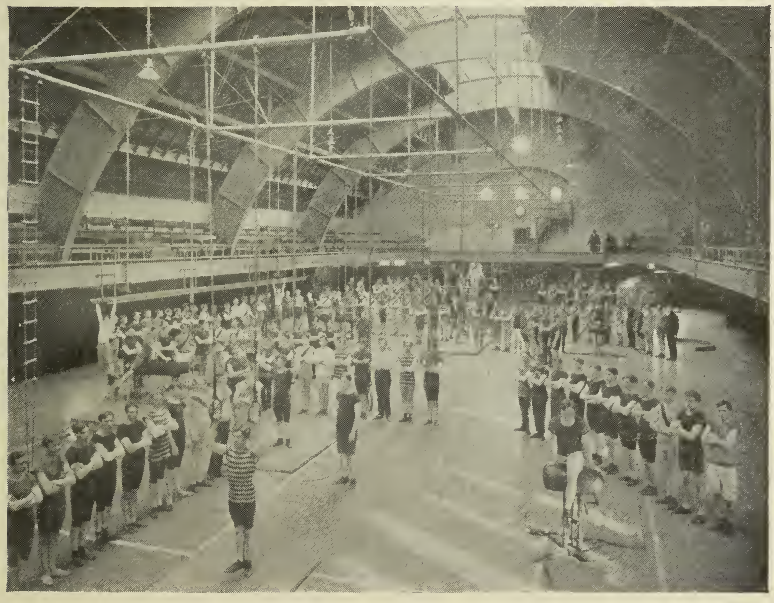
*Died April 8, 1903.

THE GYMNASIUM AND ARMORY



CLASS WORK IN GYMNASIUM

The exercising floor, 80x150 feet, is thoroughly equipped with the best apparatus in duplicate. The running track is fourteen laps to the mile, with graded elevations at the curves to meet the requirements of the different rates of speed. The track is laid with felt an inch in thickness, three and a half feet wide and covered with rubber coated canvas.

A thorough physical examination of each student is made in the fall and spring. The measurements are outlined on charts, so as to show the parts below the normal development, for which special exercise suited to the health and physical condition of each individual will be suggested. These charts are constructed from the accumulated data of several thousand measurements of college students. Experience demonstrates that the body, as well as the mind, is susceptible of right and wrong development. Every part of the body can be strengthened and increased and the relation of one part to another can also be changed so as to correct imperfections.

Class leaders are selected from among those who show proficiency in the work. After two years' service those of the leaders showing most capability are given a certificate of their appointment as Student Aides and the letter "A" in scarlet, which they are entitled to wear on their gymnasium suits.

It is the aim of the department to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Gymnasium. The course consists of theoretical and practical work in the gymnasium, and includes calisthenics, light and heavy gymnastics, physiology of exercise, physical examinations and measurements. Two hours a week from December 1 to April 1. (Required of all first and second year students.)

HISTORY

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE)

Office, University Hall, Room 15

Professor Knight, Assistant Professor Tuttle

1. **Political History of the United States.** Text-books and prescribed reading. Thwaites's The Colonies; Hart's Formation of the Union; Wilson's Division and Re-Union. Three credit hours. (Course in Manual Training, third year, first, second and third terms, M. W. F. 8 or 9.)

INDUSTRIAL ARTS

Office, Hayes Hall, Room 2

Professor Sanborn, Mr. Morlan

The shops occupy the north wing of Hayes Hall and afford excellent facilities for instruction in both the practical details and the underlying principles of carpentry, pattern-making, forging, moulding, foundry work and machine work.

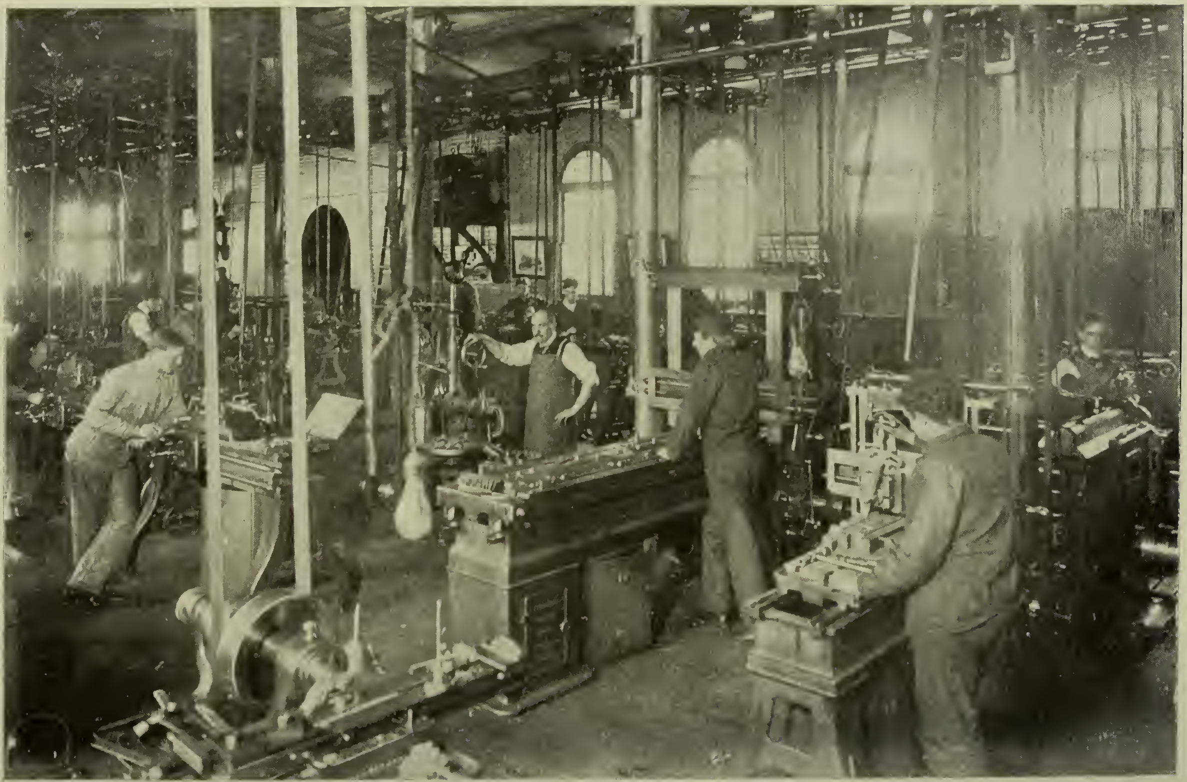
The carpenter and pattern shop is equipped with twenty-five benches with complete sets of carpenter tools for each and a large number of special tools for general use, twenty-three pattern-maker's turning lathes, with cupboards containing the necessary turning and pattern-making tools under each, an eight-foot pattern-maker's lathe with compound rest, a pony planer, a buzz planer, a circular rip and crosscut saw, a scroll saw, a 36-inch band saw, a trimmer and a power grindstone.

The forge shop is equipped with twenty stationary forges, with anvils and tools for each, a heating forge, a portable hand forge, a foot-power hammer, a blacksmith's drill and a punch, shear and bar cutter. The blast for the forges is furnished through under-ground piping by a 45-inch Buffalo pressure blower and the smoke is removed by a 55-inch Buffalo exhaust fan overhead. Both of these fans are driven by a 15-horse-power electric motor.

The foundry is equipped with a 24-inch Colliau cupola, the blast for which is furnished by a 30-inch Buffalo blower; two brass furnaces one 16 inches in diameter and the other 20 inches in diameter; a core oven, benches for iron and brass moulding, core-making and cleaning of castings, a space for floor moulding 30 feet by 40 feet, besides all the necessary moulding tools, flasks, crucibles, ladles, tongs, etc.

The machine shop is driven by a 30 horse-power electric motor from above, and is equipped with the following tools: twenty-eight benches for vise work with complete sets of tools, eight speed lathes, sixteen engine lathes, a Fox monitor turret lathe, two planers, two shapers, two milling machines, two upright drills, a sensitive drill, grinding machines for both plane and cylindrical surfaces, tool grinders, emery wheels, etc. This machinery is furnished with all the necessary tools and the tool-room is equipped with full sets of drills, taps, dies, milling cutters, standard plugs, gauges, threads, micrometers and a great variety of special tools.

Hayes Hall is a large building of pressed brick and brown sandstone, completed and equipped at a cost of about $70,000. It is devoted to instruction in Industrial Arts, Drawing, Civil Engineering, Mechanical Engineering and Domestic Science. The central portion is three stories high and the front wings are two stories each. On the first



INDUSTRIAL ARTS DEPARTMENT—MACHINE SHOP

floor are two offices, the rooms of the Department of Domestic Science and two lecture rooms, besides the machine shop, the forge shop and the foundry. On the second floor are the carpenter and pattern shops, and the Department of Civil Engineering, with private rooms annexed. The Department of Drawing occupies the third floor for instruction in mechanical and free hand drawing and photography.

1. **Tools and Machines.** Lectures and recitations on hand and machine tools and the principles underlying their construction and operation, and materials used in construction. Three credit hours. (Courses in Industrial Arts and Manual Training, third year; Short Course in Industrial Arts, second year, first, second and third terms, Tu. Th. S. 8.)

2. **Designing.** Problems in design, to accompany Course 1. Three credit hours. (Courses in Industrial Arts and Manual Training, third year; Short Course in Industrial Arts, second year, second and third terms, F. 1-4, S. 9-12.)

3. **Shop Equipment, Appliances and Management.** A continuation of Course 1. Lectures and recitations on the strength and durability of the materials used in construction; shop and factory buildings and their construction; power, power transmission and prime movers; automatic machines and other special devices for turning out cheap and accurate work; methods of compensation and shop accounts and management. Three credit hours. (Course in Industrial Arts, fourth year, first, second and third terms, M. W. F. 11.)

4. **Advanced Designing.** Problems in the design of buildings and the arrangement of machinery, line-shafting, etc., for manufacturing plants; to accompany Course 3. Three credit hours. (Course in Industrial Arts, fourth year, first and second terms, M. Tu. 1-4.; third term, W. Th. 1-4.)

5. **Workshop Appliances.** Lectures and problems on the construction of shop buildings and the arrangement of machinery; power required and the means of transmission; friction in line shafting and the efficiency of machinery; automatic machines and special shop appliances. Three credit hours. (Course in Mechanical Engineering, fourth year, third term, M. W. F. 8.)

7. **Machine Design.** Practical application of the principles of machine design. Three credit hours. (Course in Electrical Engineering, third year, third term, M. Tu. 1-4.)

8. **Machine Drawing.** Working sketches of mechanisms and machines from measurement; detail and assembly drawings of same. Three credit hours. (Short Course in Industrial Arts, second year, first term, W. Th. 1-4.)

MATHEMATICS

Office, University Hall, Room 45

Professor Bohannon, Associate Professor McCoard, Associate Professor Boyd, Assistant Professor Arnold, (Assistant Professor Swartzel), Assistant Professor Kuhn, Assistant Professor Coddington, Mr. Rasor, Mr. Skimming*

1. **Elementary Algebra.** Venable. Five credit hours. (Short Course in Clay-working, first year, first term, M. Tu, W. Th. F. 9.)

2. **Elementary Algebra.** Wentworth. Five credit hours. (Short Courses in Mining and Industrial Arts, first year, first, second, third terms, M. Tu. W. Th. F. 9.)

3. **Plane Geometry.** Venable. Five credit hours. (Short Courses in Mining and Industrial Arts, first year, first term, M. Tu. W. Th. F. 11.)

3a. **Plane Geometry.** Venable. Five credit hours. (Short Course in Clay-working, first year, second term, M. Tu. W. Th. F. 9.)

11. **Differential Equations.** Edwards. One credit hour. (Course in Mechanical Engineering, third year, first term, F. 10.)

13. **Solid Geometry.** Venable. Five credit hours. (Short Courses in Mining and Industrial Arts, first year, second term, M. Tu. W. Th. F. 11.)

14. **Trigonometry.** Plane trigonometry. Taylor and Puryear. Five credit hours. (Short Courses in Industrial Arts and Mining, first year, third term, M. Tu. W. Th. F. 8.)

31. **College Algebra.** Taylor. Five credit hours. (All Four-Year Courses, first year, first term, M. Tu. W. Th. F. 8, 9, 11, 1 or 2.)

32. **Trigonometry.** Taylor and Puryear. Five credit hours. (All Four-Year Courses, first year, second term, M. Tu. W. Th. F. 8. 9, 11, 1 or 2.)

33. **Analytics.** Ashton. Five credit hours. (All Four-Year Courses, first year, third term, M. Tu. W. Th. F. 8, 9, 11, 1 or 2.)

41. **Calculus.** Osborne. Edwards. Five credit hours. (Second year, first term.

M. Tu. W. Th. F. 1 — Course in Architecture.
" 8 — Course in Ceramics.
" 8 — Course in Chemical Engineering.
" 11 or 1 — Course in Civil Engineering.
" 8 — Course in Electrical Engineering.
" 8 — Course in Mechanical Engineering.
" 8 — Course in Mining Engineering.

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* Absent on leave.

42. **Calculus.** Five credit hours. (Second year, second term. For hours and courses see Course 41.)

43. **Calculus.** Five credit hours. (Second year, third term. For hours and courses see Course 41.)

71. **Mechanics.** Statics. Five credit hours. (Courses in Architecture, Ceramics, and Chemical, Civil, Electrical, Mechanical and Mining Engineering, third year, first term, M. Tu. W. Th. F. 8, 9 or 11.)

72. **Mechanics.** Strength of Materials. Kinetics. Five credit hours. (Courses in Architecture, Ceramics, and Chemical, Civil, Electrical, Mechanical and Mining Engineering, third year, second term, M. Tu. W. Th. F. 8, 9, 11 or 2.)

73. **Mechanics.** Kinetics. Hydraulics. Five credit hours. (Courses in Architecture, Ceramics, and Chemical, Civil, Electrical, Mechanical and Mining Engineering, third year, third term, M. Tu. W. Th. F. 8, 9 or 11.)

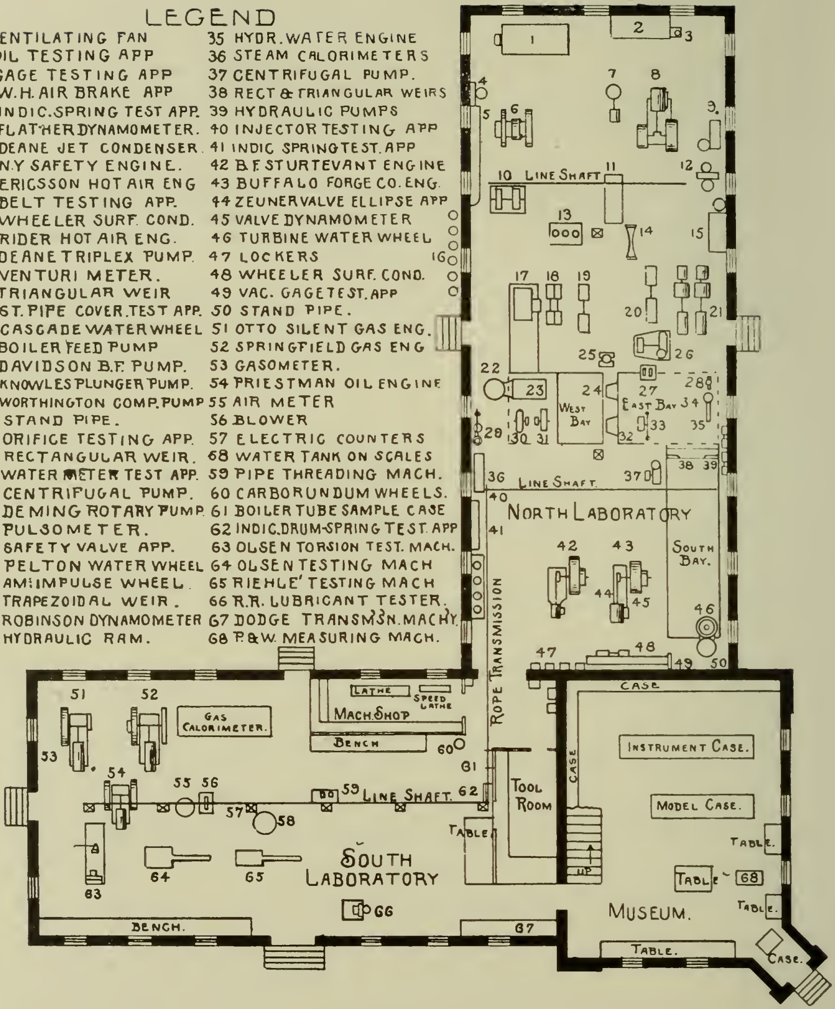
MECHANICAL ENGINEERING

Office, Hayes Hall, Room 11

Professor Magruder, Professor Hitchcock, Assistant Professor Judd, Mr. Bailey, Mr. Yost

The lectures and recitations of this Department are held in rooms Nos. 11 and 12 of Hayes Hall, and in the lecture room of the Mechanical Hall. Mechanical Hall is a brick building, 93 feet front by 32 feet deep, with a wing 32 by 80 feet. The lecture room is on the second floor. The main floor has three large rooms. The Museum is fitted with glass cases which contain the more delicate apparatus, measuring machines and other instruments of precision, samples of engineering supplies and specimens of materials which have been tested and broken either in the laboratory or in practice. It also contains a collection of models of mechanism and valve gears.

The south laboratory is used for applied mechanics and for gas engineering. Here are located the machines for testing the strengths and elasticities of engineering materials, and recording their physical properties automatically and autographically. Oils are tested as lubricants. The gas engine plant has three engines, using gas, gasoline or oil. These illustrate three methods of ignition, and fly ball and inertia governors. The air may be supplied by a fan through a large meter. Measurements are taken of the temperatures and pressures of the air, gas and water used. The fresh and burnt gases are analyzed and their heating values determined by a calorimeter. The power is measured with both the indicator and the brake. The laboratory machine shop and tool room are in this room.



LEGEND

1 VENTILATING FAN
2 OIL TESTING APP
3 GAGE TESTING APP
4 W.H. AIR BRAKE APP
5 INDIC. SPRING TEST APP.
6 FLATHER DYNAMOMETER.
7 DEANE JET CONDENSER.
8 N.Y. SAFETY ENGINE.
9 ERICSSON HOT AIR ENG
10 BELT TESTING APP.
11 WHEELER SURF. COND.
12 RIDER HOT AIR ENG.
13 DEANE TRIPLEX PUMP.
14 VENTURI METER.
15 TRIANGULAR WEIR
16 ST. PIPE COVER TEST APP.
17 CASCADE WATER WHEEL
18 BOILER FEED PUMP
19 DAVIDSON B.F. PUMP.
20 KNOWLES PLUNGER PUMP.
21 WORTHINGTON COMP. PUMP
22 STAND PIPE.
23 ORIFICE TESTING APP.
24 RECTANGULAR WEIR.
25 WATER METER TEST APP.
26 CENTRIFUGAL PUMP.
27 DEMING ROTARY PUMP.
28 PULSOMETER.
29 SAFETY VALVE APP.
30 PELTON WATER WHEEL
31 AM: IMPULSE WHEEL.
32 TRAPEZOIDAL WEIR.
33 ROBINSON DYNAMOMETER
34 HYDRAULIC RAM.
35 HYDR. WATER ENGINE
36 STEAM CALORIMETERS
37 CENTRIFUGAL PUMP.
38 RECT & TRIANGULAR WEIRS
39 HYDRAULIC PUMPS
40 INJECTOR TESTING APP
41 INDIC SPRING TEST. APP
42 B.F. STURTEVANT ENGINE
43 BUFFALO FORGE CO. ENG.
44 ZEUNER VALVE ELLIPSE APP
45 VALVE DYNAMOMETER
46 TURBINE WATER WHEEL
47 LOCKERS
48 WHEELER SURF. COND.
49 VAC. GAGE TEST. APP
50 STAND PIPE.
51 OTTO SILENT GAS ENG.
52 SPRINGFIELD GAS ENG
53 GASOMETER.
54 PRIESTMAN OIL ENGINE
55 AIR METER
56 BLOWER
57 ELECTRIC COUNTERS
68 WATER TANK ON SCALES
59 PIPE THREADING MACH.
60 CARBORUNDUM WHEELS.
61 BOILER TUBE SAMPLE CASE
62 INDIC. DRUM-SPRING TEST. APP
63 OLSEN TORSION TEST. MACH.
64 OLSEN TESTING MACH
65 RIEHLE' TESTING MACH
66 R.R. LUBRICANT TESTER.
67 DODGE TRANSMSN. MACHY.
68 P. & W. MEASURING MACH.

GROUND PLAN
OF
EXPERIMENTAL ENGINEERING LABORATORY.

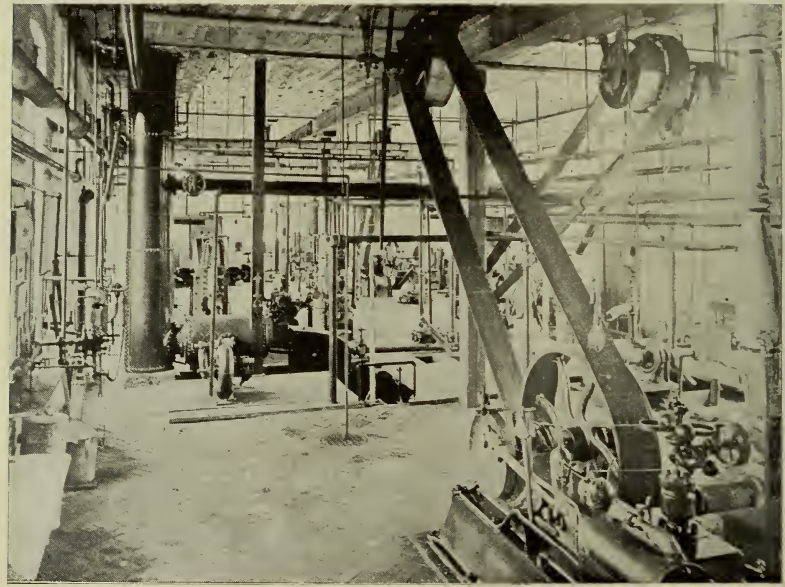
The north laboratory is used as a steam engineering and hydraulic laboratory. Three 35-horse-power engines give facilities for testing single or twin. condensing or non-condensing, simple or compound, throttling or automatic cut-off engines, using either jet or surface condensers. Pressure and vacuum gauges are calibrated. Indicator springs of five makers are tested both cold and hot. Five kinds of calorimeters determine the moisture in steam before and after passing three different separators. Injectors are tested for lift, quantity, pressure and steam consumption. Simple and compound steam pumps of six makes (ranging to 1200 gallons per minute capacity), two centrifugal, a triplex power and a rotary pump are available for testing. They deliver water at pressure up to 150 pounds to two stand-pipes. These in turn supply turbine, Cascade, Pelton and American impulse water wheels, and also enable experiments to be made on the flow of water through orifices, pipes, valves, etc. Three cisterns, provided with a variety of weirs up to five feet wide, give practice in measuring flowing water. A Venturi meter and Pitot tubes are also used. Ericsson and Rider hot air engines are tested. A Rife hydraulic engine, a Humphreys ram, Gem and Eureka water motors and a pulsometer are included in the hydraulic apparatus, all of which are connected and prepared for complete tests. Oils are tested for their viscosity and other physical properties.

A complete set of Westinghouse air-brake apparatus, a steam-driven air compressor, a compressed air engine and air meter are used in studying the subject of compressed air. These together with a blower and a ventilating fan, enable experiments to be performed in the flow of air. They in turn are supplemented by tests of the heating and ventilating plants in the building on the campus. Belts and pulleys are tested for their slippage, friction and horse-power transmitted.

The Robinson experiment boiler gives unexcelled facilities both for laboratory exercises in the use, care and testing of steam boilers, and for the solution of original problems in this branch of engineering practice and research.

In addition to the apparatus and equipment of the power plant of the University (for description see page 102), the power house at Townshend Hall contains a horizontal, return tubular boiler, two steam engines and a six-ton ammonia compression refrigerating machine fitted up with thermometers and ammonia meter, and prepared for making complete tests, thereby making the facilities on the campus for engineering tests quite complete. Machinery, apparatus and appliances are continually being presented, built or purchased, and the student is given an opportunity to test everything under the practical conditions of operation. Besides the laboratory facilities, opportunities frequently arise to test machinery, engines or boilers in the city, and in these tests the students take part.

EXPERIMENTAL ENGINEERING LABORATORY
GAS ENGINES AND TESTING APPARATUS



EXPERIMENTAL ENGINEERING LABORATORY
STEAM ENGINES AND HYDRAULIC MACHINES

3. **Mechanism.** Lectures and recitations on the principles of mechanism and mechanical movements. Five credit hours. (Courses in Electrical and Mechanical Engineering, third year, second term, M. Tu. W. Th. F. 8; or M. Tu. Th. F. 10, S. 8.)
The accurate laying out of movements, embodying the principles of mechanism. Two credit hours. (Course in Mechanical Engineering, third year, third term, M. Tu. 1-3.)

12. **Experimental Engineering Laboratory.** Calibration of pressure gauges and indicator springs; steam engine indicator practice and oil testing. Two credit hours. (Course in Mechanical Engineering, third year, first term, M. or W. 1-5. Course in Industrial Arts, fourth year, first term, Th. 1-5.)

14. Continuation of Course 27. Four credit hours. (Course in Mechanical Engineering, fourth year, second term, M. Tu. 1-5.)

15. Continuation of Course 14. Testing of steam boilers, injectors, steam, centrifugal and power pumps, pulsometer and hydraulic rams. Three credit hours. (Course in Mechanical Engineering, fourth year, third term, M. Tu. 9-12; or Th. F. 9-12.)

17. **Experimental Engineering.** Practice in the testing of materials of construction, calibration of orifices and weirs, study of the flow of liquids and gases, accompanied by lectures and recitations on laboratory practice, steam engines, boilers and and power transmission. Three credit hours. (Course in Civil Engineering, fourth year, second term, Th. 11, F. 1-5.)

18. **Machine Design.** Recitations on Unwin's Machine Design, with lectures on American practice. Five credit hours. (Course in Chemical Engineering, fourth year, first term, M. Tu. W. Th. F. 11. Course in Mechanical Engineering, fourth year, first term, M. Tu. W. Th. F. 9. Courses in Chemical and Mechanical Engineering, fourth year, second term, M. Tu. W. Th. F. 11.)

19. **Machine Design.** Practical applications of the principles of machine design. Five credit hours. (Courses in Chemical and Mechanical Engineering, fourth year, third term, M. 1-5, Tu. W. 1-4.)

21. **Thesis Work.** Five credit hours. (Course in Mechanical Engineering, fourth year, third term.)

2. **Timber and Masonry.** Lectures on the construction of foundations and structures in timber and masonry. Three credit hours. (Courses in Industrial Arts and Mechanical Engineering, third year, last three-fifths of second term, M. Tu. W. Th. F. 9.)

23. **Materials of Construction.** Lectures on the materials used in architectural and building construction, and laboratory exercises on their properties. Four credit hours. (Course in Architecture, fourth year, first term, M. Tu. 10, F. 1-5.)

24. **Experimental Engineering Laboratory.** Arranged to meet the needs of those desiring to elect advanced laboratory work. Three credit hours. (First and second terms. Elective to third and fourth year engineers.)

25. Continuation of Course 17. Tests of steam, power, rotary and centrifugal pumps; water motor and turbine wheel. Five credit hours. (Course in Civil Engineering, fourth year, third term, W. 9, M. Tu. 2-5.)

27. Continuation of Course 12. Testing materials of construction, steam engine, hot air engine and air compressor tests, transmission and absorption dynamometer trials and testing of belts. Five credit hours. (Course in Mechanical Engineering, fourth year, first term, W. Th. 11, 1-5; or M. F. 11, 1-5.)

28. **Experimental Engineering Laboratory.** Testing materials of construction, transmission and absorption dynamometer tests, testing of lubricating oils. Two credit hours. (Course in Electrical Engineering, third year, third term, Th. or F. 1-5. Course in Manual Training, fourth year, third term, F. 1-5.)

29. Continuation of Course 28. Testing of pressure gauges and indicator springs, steam engine indicator practice and steam engine trials. Three credit hours. (Course in Electrical Engineering, fourth year, first term, Tu. or Th. 10-12, 1-5.) Two credit hours. (Course in Industrial Arts, fourth year, second term, W. 1-5.)

30. Continuation of Course 29. Steam engine and boiler trials, steam and power pump tests and hydraulic experimentation. Two credit hours. (Course in Electrical Engineering, fourth year, second term, Th. 10-12, 1-5. Course in Industrial Arts, fourth year, third term, F. 1-5.)

31. **Hydraulic Machinery.** Recitations and lectures on pumping machinery. Three times a week. (Course in Mechanical Engineering, fourth year, third term, Tu. Th. 8, W. 9.)

32. **Mechanical Engineering of Power Plants.** A descriptive study of steam and gas engines, boilers, pumps, injectors and other machinery used in plants generating power. Five credit hours. (Courses in Chemical and Electrical Engineering, and Industrial Arts, third year, third term, M. Tu. W. Th. F. 9. Course in Mechanical Engineering, third year, third term, M. Tu. W. Th. F. 11. Course in Manual Training, fourth year, third term, M. Tu. W. Th. F. 9.)

33. **Steam Engines and Boilers.** A detail study of steam using and steam generating machinery. Five credit hours. (Courses in Electrical and Mechanical Engineering, fourth year, first term, M. Tu. W. Th. F. 8.)

34. **Thermodynamics.** Lectures and recitations on the transmutations of heat and mechanical energies in steam, gas and air engines, and in air and ammonia compressors, together with a study of the tests of ideal and actual engines and of their indicator diagrams; the flow of gases through pipes and orifices. Five credit hours. (Course in Mechanical Engineering, fourth year, second term, M. Tu. W. Th. F. 8.)

35. **Experimental Engineering Laboratory.** Five credit hours. (Option, Course in Chemical Engineering, fourth year, second term, M. 9, M. Tu. 1-5.)

36. **Experimental Engineering Laboratory.** Lectures and recitations on power transmission, steam engines and boilers. Laboratory; testing pressure gauges, indicator springs, etc.; valve setting; testing of steam engines, steam, power and centrifugal pumps; boiler and fuel trials. Five credit hours. (Courses in Ceramics and Mine Engineering, fourth year, third term, Tu. Th. 10-11, W. Th. 1-4.)

METALLURGY

(DEPARTMENT OF METALLURGY AND MINERALOGY)

Office, Chemical Hall, Room 5

Professor N. W. Lord, Mr. Somermeier, Mr. Spitler

The Department of Metallurgy and Mineralogy occupies the eastern part of Chemical Hall. In the basement are the smelting furnaces, the assay laboratory, a room for rough work, and store rooms for supplies. On the first floor is the lecture room of the professor in charge, a laboratory with desks for twenty-two students, a store room, a balance room, a private laboratory and office.

The metallurgical laboratory has all the appliances for the most modern methods of technical analysis as practiced in iron and steel laboratories, including gas analysis. A large room in the basement is fitted for gold and silver assaying, with improved muffle and melting furnaces, sampling apparatus and assay balances.

The lecture room in metallurgy has a projection lantern with a large collection of views of machines, mines, and furnaces. There is a photographic room with blue-printing facilities, where students learn to make copies of drawings used in illustrating the lectures.

A collection of minerals and rocks with a large set of rock sections is provided for illustrating the mineralogy, as well as sets of blow-pipe apparatus for the students in determinative mineralogy.

2. **Mineralogy.** Lectures arranged so as to be preparatory to Determinative Mineralogy (Course 3). Three credit hours. (Courses in Chemical and Mining Engineering, second year, third term; Course in Ceramics, third year, third term, M. W. F. 11.)

ASSAY LABORATORY

3. **Determinative Mineralogy.** Laboratory course in practical determination of minerals by physical and chemical tests. Each student is furnished with a set of apparatus, and works under an instructor's inspection. Brush's Determinative Mineralogy is used as a manual. Five credit hours. (Course in Mining Engineering, third year, third term, M. Tu. W. 1-4.)

4. **Metallurgy.** A course of lectures upon fuel and its uses, iron and steel, copper, lead, gold and silver, their properties, tests, ores and details of the methods of reduction. The lectures are supplemented by a careful study of references to standard works and journals. Five credit hours. (Course in Mining Engineering, third year; Option, Course in Chemical Engineering, fourth year, first and second terms, M. Tu. W. Th. F. 9. Courses in Industrial Arts and Mechanical Engineering, third year; Course in Ceramics, fourth year, first term, M. Tu. W. Th. F. 9.) Two credit hours. (Courses in Industrial Arts and Mechanical Engineering, third year, first two-fifths of the second term, M. Tu. W. Th. F. 9.)

5. **Metallurgical Laboratory.** Lectures and laboratory work. Laboratory practice in the analysis of iron and steel, fuel and slags, and the assay of lead, copper and zinc ores by wet methods, using approved methods as practiced in technical laboratories of metallurgical works. Course 5 must be preceded by Chemistry 7. Five credit hours. (Course in Mining Engineering, second year, first, second and third terms; Course in Chemical Engineering, third year, first term, W. Th. F. 1-4.)

6. **Assaying.** Laboratory work. Practical work in the assaying of gold, silver and lead ores, by furnace methods. Five credit hours. (Courses in Chemical and Mining Engineering, third year, second term, M. Tu. 11, 1-5.)

7. **Metallurgical Construction.** Practice in the designing of furnaces and other metallurgical machinery, including detail drawings and estimates. Three credit hours. (Course in Mining Engineering, fourth year, second term, Th. F. 1-4.)

8. **Ore Dressing and Coal Washing.** Instruction in the methods of concentrating and enriching ores and fuels by mechanical means. Lectures, with reference to standard books and various papers in technical journals. Two credit hours. (Course in Mining Engineering, fourth year, first term, Tu. F. 10.)

9. **Mineral Chemistry.** Lectures upon fire-damp, mine explosions, explosives, boiler waters, poisonous gases, iron ores; iron and steel, their properties and modes of manufacture; coal and coke. Five credit hours. (Short Course in Mining, second year, third term, M. Tu. W. Th. F. 8.)

MILITARY DRILL

Office, Armory Room

Captain George L. Converse. U. S. A.

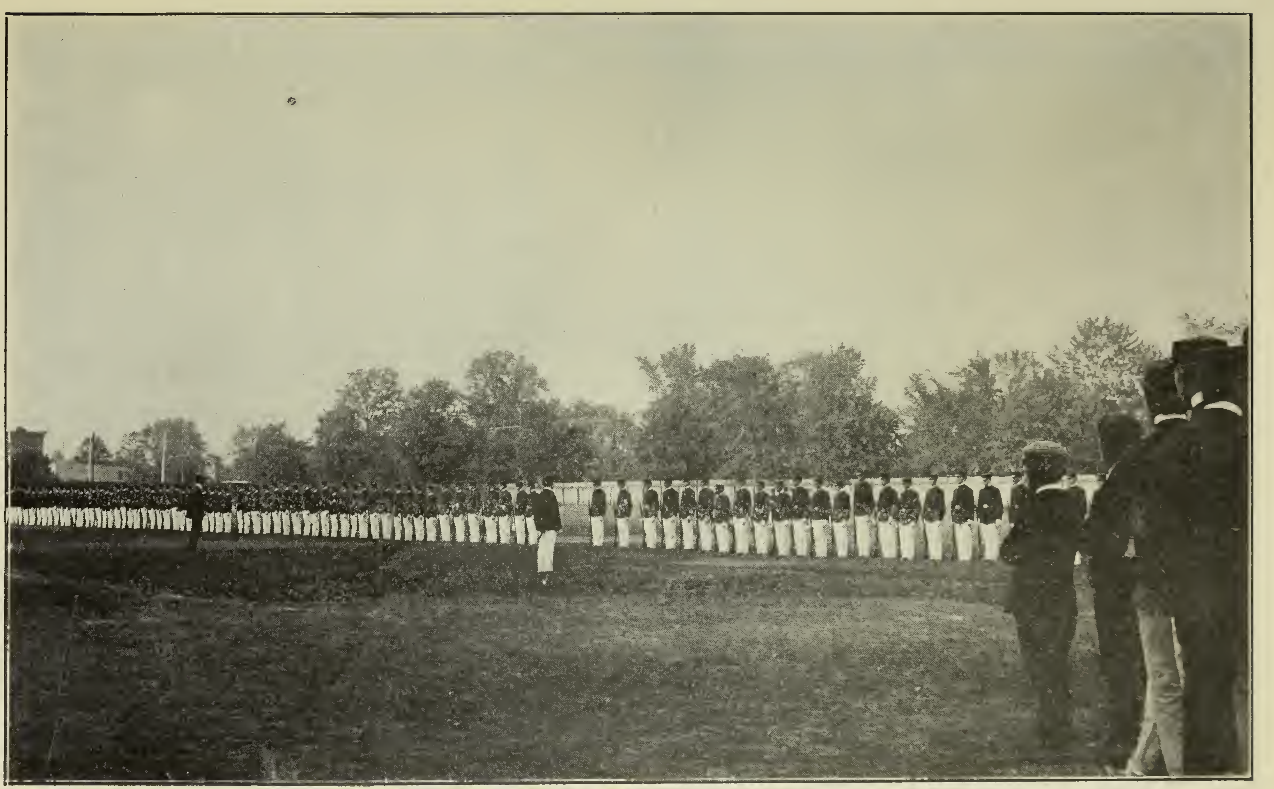
The same building used as a gymnasium is also employed as Armory and Drill Hall by the University Battalion. This is in charge of a Commandant from the United States Army, apart from whom it is officered entirely by students. Since participation is required of all students during the first two years of their course, the size of the battalion is such as to make interesting maneuvers possible. Besides its military importance as shown by the prominent place taken by former students in the Ohio troops of the late war, and in the United States Army, the great value of this work in the physical development of the student is thoroughly recognized by all educators.

The drill begins with four hours per week in the first term, which is outside, weather permitting. The fall work is largely devoted to squad drill in the setting up exercises, facings, marching, etc., and company drill according to progress of the squads. In December the drill is reduced to two hours per week until April, with one hour additional for theoretical work. During these months drill is confined to work inside the Gynasium, manual of arms, guard mounting and such ceremonies as can be performed within a limited space. From April 1st to the end of the term all work is outside, weather permitting, four days of each week, as follows: :—Mondays, Company drill; Tuesdays, Battalion drill; Wednesdays, ceremonies other than guard mounting; Thursdays, guard mounting and Company drill. During the entire year and on the same days as enumerated above, the O. S. U. Band either has its practice hour or takes part in ceremonies and drill. Similarly the Signal Corps belonging to the battalion exercises in the flag drill or at telegraph work. The battalion of cadets is modeled after a battalion of U. S. infantry, and consists of six companies under command of a Cadet Major. Army regulations are followed strictly. The battalion for the year 1902-3 has averaged about six hundred men and officers under command of Cadet Major Ward and Captains Booth, Maxwell, Fulton, Rice, Adair, Overturf. The military department is open five days per week of each term.

1. **Military Drill.** Four times a week, from the opening of College till the Thanksgiving vacation; twice a week from Thanksgiving till April first; four times a week till the close of the school year. Required of all able-bodied male students during first and second years of their course.

2. **Tactics.** Lectures and recitations. Twice a week. (Second term. Elective.)

4. **Customs of the Service.** Lectures and recitations. Twice a week. (Second term. Required of the whole battalion.)



CADET BATALLION — COMPETITIVE DRILL

MINE ENGINEERING

Office, Chemical Hall, Room 29

Professor Ray

This Department is equipped with all of the latest improved instruments and apparatus used in mine engineering, surveying and the study of mine ventilation. There is a collection of models of mine machinery and supplies, to which additions are being made which are valuable as illustrations. The draughting room is large, well lighted and provided with a desk for each student, where he is personally taught the making of maps, the platting of actual surface and underground surveys, the making of drawings, tracings and blue-prints. He is also taught proper methods of keeping notes and all records necessary to an efficient engineer's office. The students are given practical experience by making actual surveys of coal mines and in working up their notes complete in all of the necessary details. The students are also taught how to make working drawings, plans, estimates and specifications of mining operations and equipment.

There is a large collection of views of machines, mines and mine equipment for use in the projection lantern in the lecture room. A photographic room with blue-printing facilities is used by the students in making copies of their own drawings and those illustrating the lectures.

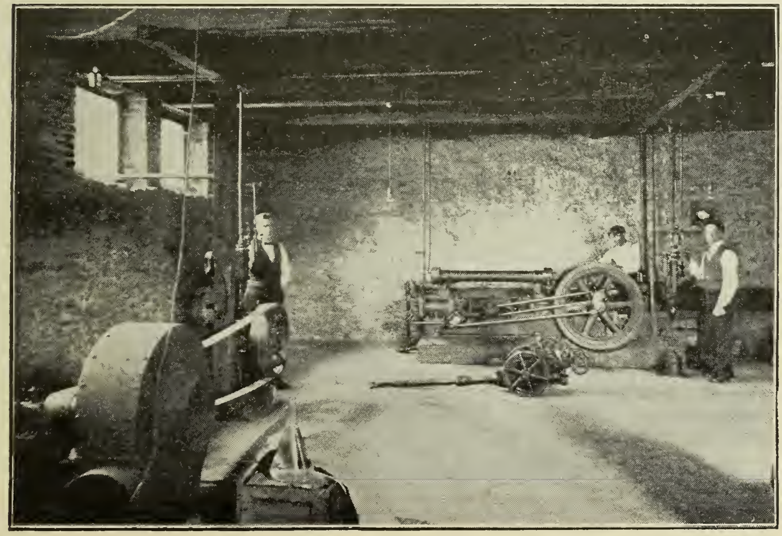
The Mining Engineering Course pays special attention to underground surveying, mapping, timbering, ventilation and other matters relating to safety and speed, system and method in extracting coal and other minerals.

The coal mines of central Ohio are easily accessible to the University and furnish an extremely valuable field for illustrating the practical systems and methods of mine surveying, systems of mining, timbering, haulage, drainage and ventilation, tipple construction and general arrangement of mining plants.

During their course the mining students are required to make frequent trips and to spend sufficient time at the mines in actual work and observation to become familiar with practical mine surveying and the details of mine equipment and management. This work is further supplemented by visits to shops or public works, which afford practical illustrations of engineering work in the process of construction.

1. **Mine Surveying.** Lectures and field practice. This is similar to Course 4, but more elementary. The same text is used. The students have more practice in the drawing room. Five credit hours. (Short Course in Mining, second year, first term, M. Tu. W. Th. F. 11.)

LABORATORY FOR METALLURGICAL CHEMISTRY



MINING ENGINEERING LABORATORY—FANS AND COMPRESSOR

2. **Ventilation and Haulage.** Lectures illustrated by experiments and maps of mines and models when possible, tests by safety lamps and anemomoters, and methods of air distribution in coal mines. Five credit hours. (Short Course in Mining, second year, second term, M. Tu. W. Th. F. 11.)

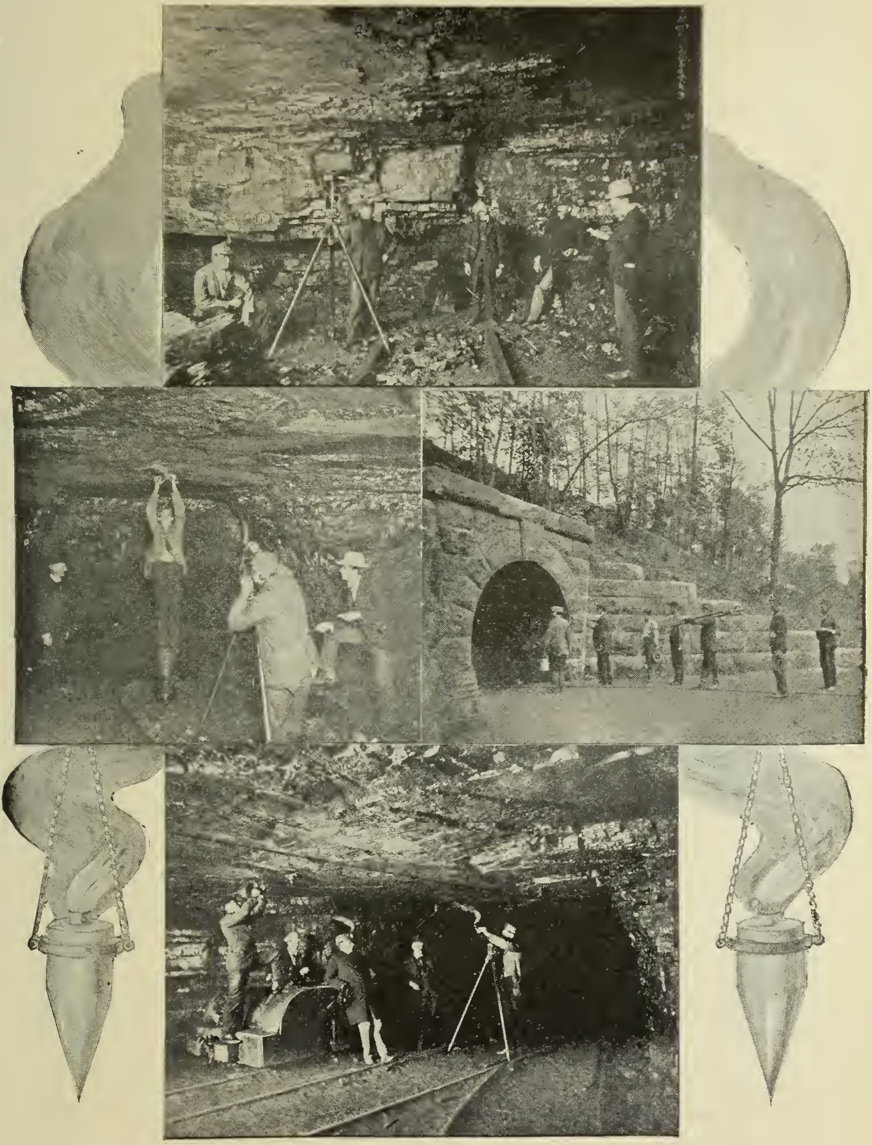
3. **Mine Operating.** A course of lectures and practical instruction in mine book-keeping and accounts, cost of working, etc., particularly adapted to Ohio coal mining. Five credit hours. (Short Course in Mining, second year, third term, Tu. Th. F. 10, M. 9-11.)

4. **Mine Surveying.** Field practice in the use of instruments for surface and underground surveys. Full notes are taken and maps and plans made in the drawing room. Davies's Surveying by Van Amringe is used as a text-book. Five credit hours. (Courses in Mining Engineering and Ceramics, third year, first term, M. Tu. Th. F. 10, M. 1-3.)

5. **Mine Engineering.** Lectures. Mine operating, mining machinery, ventilation, shaft-sinking, working out deposits, etc. Constant reference is required to the standard works and to the leading technical journals, with practice in designing mine plants, draughting and estimates. Five credit hours. (Course in Mining Engineering, fourth year, first, second and third terms, M. Tu. W. Th. F. 8.)

6. **Plans and Specifications.** Five credit hours. (Course in Mining Engineering, fourth year, third term, M. Tu. W. Th. F. 11.)

7. **Surveying.** Practical experience in surveying in some mine convenient to Columbus; the time taken in one trip of not more than four consecutive days. One credit hour. (Course in Mining Engineering, third year, second term.)



CLASS IN MINING ENGINEERING AT WORK IN COAL MINE

PHYSICS

Office, University Hall, Room 13

Professor Thomas, Professor Cole, Assistant Professor Kester, Mr. Tuckerman

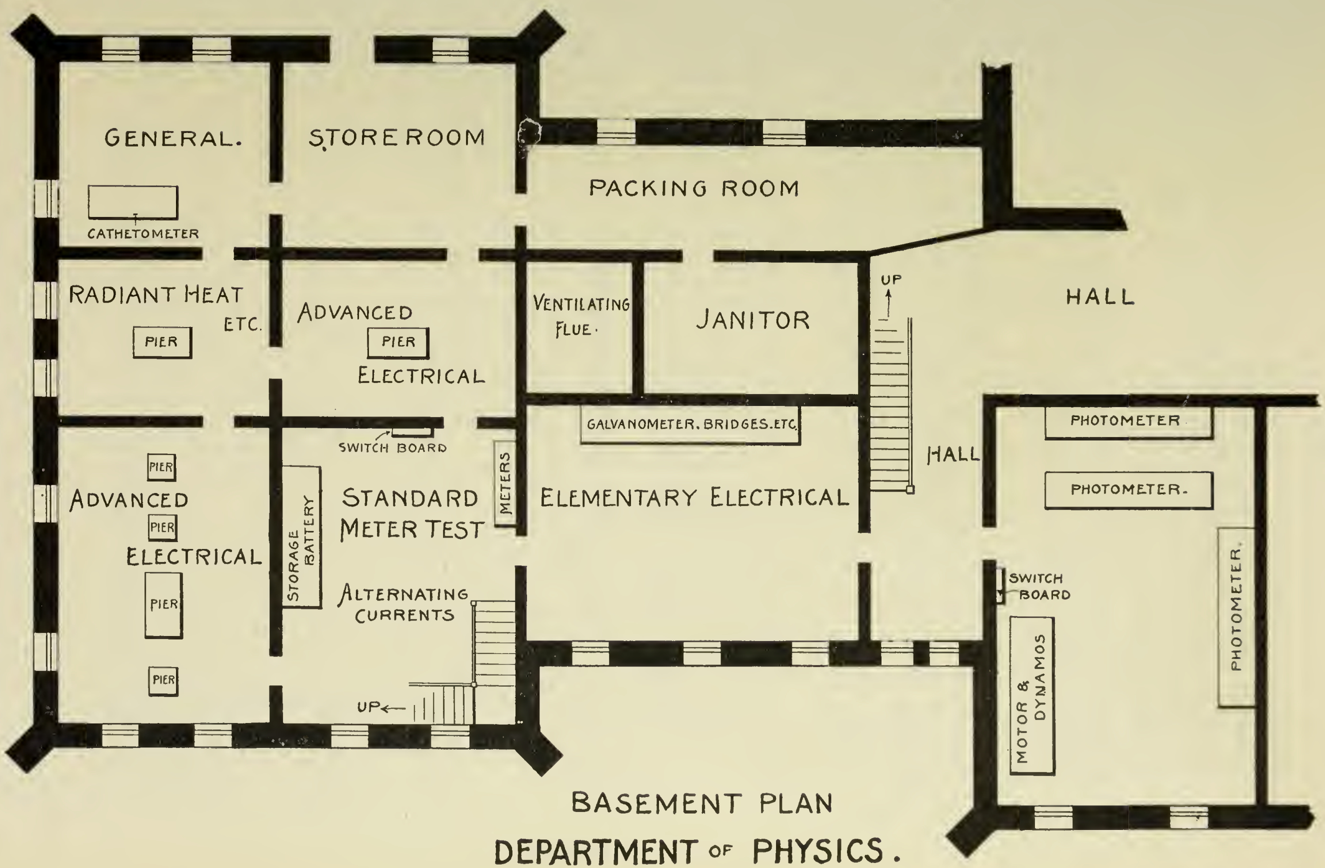
The Department of Physics occupies the west half of the first two floors and basement of University Hall. The first floor rooms are the principal lecture room, fifty-five by thirty-eight feet; the elementary lecture room; an instrument room, and the office of the Department.

On the second floor are rooms for elementary laboratory work, and a dark room for photographic work, in connection with spectrum and Roentgen-ray apparatus. The lecture room on the first floor is also used in laboratory work. In the basement, provision is made for advanced exercises in electricity, heat, etc. The basement plan on an adjoining page gives a general idea of its arrangement, and of the character of the work provided for.

The Department has an excellent equipment of apparatus, to which additions are constantly being made. The apparatus includes a large collection of pieces for illustration of the general lecture room work, but is principally chosen for accurate measurement in the laboratory. A set of standards of length, capacity and mass, sent under the act of Congress supplying such sets to the several agricultural colleges, is in the possession of the Department. The pieces are copies of the United States standards made by the Coast Survey at Washington.

Among the principal pieces of apparatus are a dividing machine by Fauth & Co.; chronometers by Parkinson & Frodsham and by Negus, the latter a break-circuit; a chronograph by Fauth & Co.; a Hipp's chronoscope; cathetometers by Salleron and by the Geneva Society, the latter an exceptionally fine instrument; Regnault's apparatus for vapor tension, for expansion of gases and for specific heat; Melloni-Tyndall apparatus for radiant heat; standard thermometers by Baudin and others; Rutherford and Rowland diffraction gratings; Rowland's spectrum photographs, spectroscopes by Brashear, Browning, Apps and others; Michelson's interferometer; Salleron's complete apparatus for projections in polarized light; lanterns for projections by the lime light and the arc light; a variety of sound apparatus from Koenig; portable and quadrant electrometers; Kelvin galvanometers of high and low resistance; Wiedemann, Kohlrausch and other galvanometers; standard resistance coils, with Cavendish laboratory and Reichanstalt certificates; several sets of resistance coils and bridges; a Kew magnotometer; Kelvin Standard balances; Weston ammeters and voltmeters; standards of self-induction; standard battery cells; potentiometers; a Duddell oscillograph; photometric standards and photometers; X-ray apparatus, etc.

Under the laws of Ohio, the professor of Physics is ex-officio State Sealer of Weights and Measures, and all of the standard weights, measures and balances received from the United States government are in the rooms of the Department.



BASEMENT PLAN

DEPARTMENT OF PHYSICS.

1. **Elementary Physics.** Recitations and experimental lectures. Text: Carhart & Chutes' "Elements of Physics." Five credit hours. (Short Courses in Mining, first year, first and second terms, M. Tu. W. Th. F. 8. Short Course in Clay-Working, first year; Short Course in Industrial Arts, second year, first and second terms, M. Tu. W. Th. F. 11.)

2. **Mechanics and Heat. Electricity and Magnetism. Sound and Light.** Lectures and recitations. Three credit hours. (All four-year courses, second year, first, second and third terms, M. W. F. 9.)

3. **Physics.** Extension of Course 2, with practice in solution of problems. Two credit hours. (Courses in Electrical Engineering, Ceramics, Industrial Arts and Manual Training, second year, first, second and third terms, Tu. Th. 9.)

4. **Electricity and Magnetism.** Lectures and recitations. Three credit hours. (Course in Electrical Engineering, third year, first term, M. Tu. Th. 10.)

5. **Physical Laboratory.** Elementary manipulation. Length, mass and time measurements. Work in density, elasticity and in heat. Four credit hours. (Course in Electrical Engineering, second year, third term, M. Tu. 1-4, W. 1-3; or W. 1-3, Th. F. 1-4. Option, Course in Manual Training, third year, first, second and third terms, M. Tu. 1-4 W. 1-3.)

6. **Physical Laboratory.** Theory and practice of magnetic and electrical measurement, including the testing and standardizing of instruments; conductivity of conductors; insulation, capacity and resistance of insulated conductors and cables; temperature co-efficients; commercial measuring and testing instruments; strength and distribution of magnetic fields; magnetic moments, permeability; work in light, including optical constants; spectroscopy; photometry of gas, electric and other lights. Five credit hours. (Course in Electrical Engineering, third year, first and second terms, M. Tu. W. 1-4.)

7. **Physical Laboratory.** Two credit hours. (Course in Mechanical Engineering, second year, second term, M. Tu. 1-3; or Th. F. 1-3.) Three credit hours. (Course in Mechanical Engineering, second year, third term, M. Tu. 1-4; or Th. F. 1-4.) Three to five credit hours. (First, second and third terms. Elective.)

9. **Physical Laboratory.** A second year's work in Physical Laboratory. Course 9 must be preceded by Courses 6 or 7. Three to five credit hours. Elective.

POLITICAL SCIENCE

(DEPARTMENT OF AMERICAN HISTORY AND POLITICAL SCIENCE)

Office, University Hall, Room 15

Professor Knight, Assistant Professor Smith

1. **Political Institutions of the United States.** Lectures and recitations. A study of the origin and nature of the political institutions of the United States, and an analysis of the form and powers of the government. Bryce's American Commonwealth; Burgess's Political Science. Three credit hours. Open only to students who have had American History 1. (Course in Manual Training, fourth year, first term, M. W. F. 8.)

RHETORIC

(DEPARTMENT OF RHETORIC AND ENGLISH LANGUAGE)

Office, University Hall, Room 44

Professor Denney, Assistant Professors Graves, McKnight and Dickinson, Miss Ewalt, Miss Pennock, Mr. Muirie

1. **Paragraph Writing and Analysis of Prose.** Two credit hours. (All four-year courses, first year, first, second and third terms, Tu. Th. 8; W. F. 8; or Tu. Th. 9 or 10.)

2. **Expository Writing.** Two credit hours. (Courses in Industrial Arts, Manual Training, and Electrical and Mechanical Engineering, second year; Courses in Architecture, Ceramics and Chemical, Civil and Mining Engineering, third year, first term, M. F. 10; or Tu. Th. 10; or Tu. Th. 11; or W. F. 1.)

3. **Brief-Making and Written Argumentation.** Two credit hours. (Courses and years as in 2, second term, M. F. 10; or Tu. Th. 10; or Tu. Th. 11. Third term, M. F. 10; or Tu. Th. 10.)

10. **Advanced Composition.** One credit hour. Three terms. Elective.

21. **Essentials of Oral Discourse.** One half credit hour. (All four-year courses, first year, first, second and third terms, M. 8, 9, 10, 1, 2; Tu. 8, 9, 3; W. 11; Th. 8, 9; or F. 8.)

SHOPWORK

(DEPARTMENT OF INDUSTRIAL ARTS)

Office, Hayes Hall, Room 2.

Professor Sanborn, Assistant Professor Knight, Mr. Renck, Mr. Crowe

Note.—For time requirements, credit given, and all similar information concerning shopwork courses, see table page 98.

3. **Foundry Work.** Exercises and practice in tempering sand and preparing moulds of machine parts in the sand, core-making, melting iron and brass and pouring castings.

4. **Chipping and Filing.** Exercises and practice in vise work, including chipping in cast and wrought iron, surface filing, squaring, fitting, finishing, and the scraping of surface plates.

7. **Carpentry and Pattern Making.** Exercises and practice in carpentry, wood-turning and pattern making, including sawing, planing, mortising, splicing, framing and other work involving the use of the ordinary carpenter tools; center and chuck turning; the making of finished patterns; and enough elementary molding to illustrate draft, parting, cores, etc.

8. **Carpentry: Cabinet Work.** Exercise and practice in cabinet making, including panelling, mitre and dovetail joints, etc.; use of power tools.

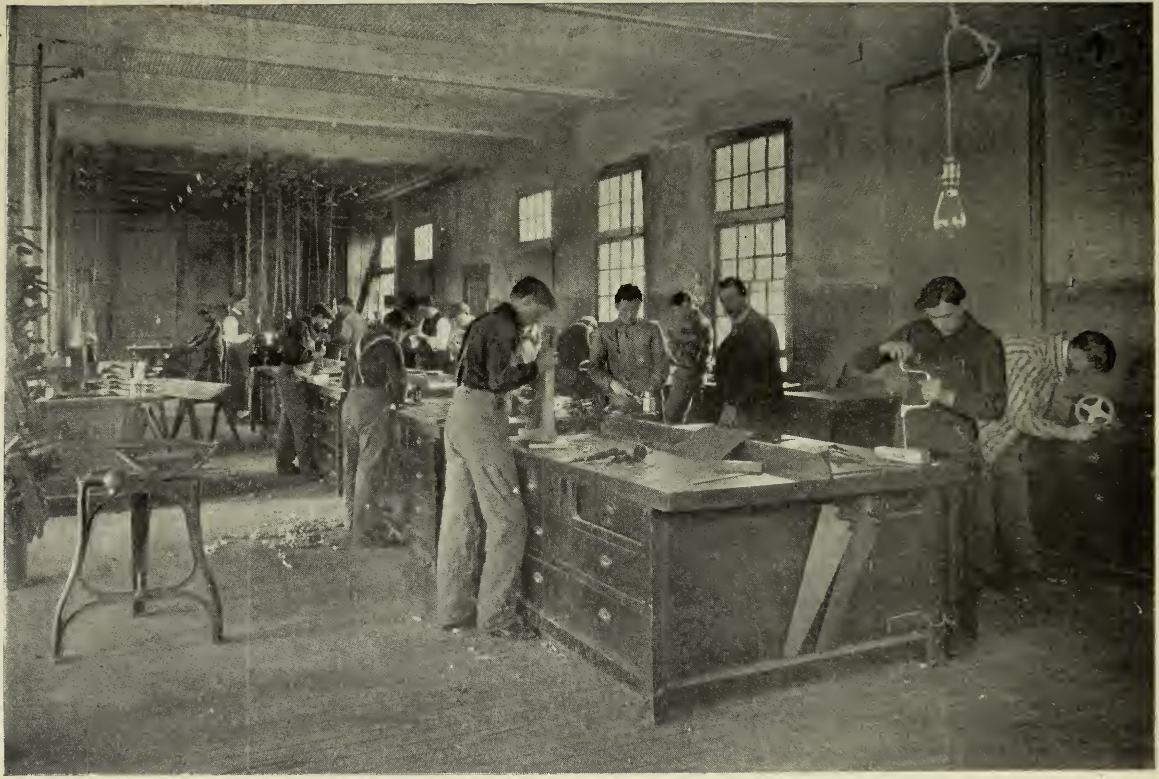
9. **Advanced Pattern Making.** Continuation of pattern work of Shopwork 7.

11. **Forging.** The use and care of forge, fire and tools; practice in iron and steel forging, including such operations as cutting, bending, drawing, upsetting, shaping and welding iron; the making, hardening and tempering of steel punches, chisel and lathe tools.

12. **Advanced Forging.** Various forms of welds in iron and steel; the use of scrolling irons and of forms for duplicating work; annealing; tool making; case-hardening; tempering drills, dies and cutters; spring making; ornamental iron work; visits to shops.

13. **Machine Work.** Exercises and practice in hand-turning in iron and brass on speed lathes; in straight and taper turning, boring, fitting, chucking, and thread-cutting on engine lathes.

14. **Machine Work.** Exercises and practice on the lathe, planer, shaper, drill press and milling machine, with use of small tools as drills, taps, dies, reamers, counterborers, etc.; construction of parts of actual machines.



INDUSTRIAL ARTS DEPARTMENT—WOODWORKING ROOM

15. **Advanced Machine Work.** Exercises and practice on turret lathe, universal, surface and tool grinding machines; in gear cutting, etc.

16. **Advanced Machine Work.** The construction and use of jigs and templates; the accurate laying out of work; the duplication of parts, the production of work rapidly and economically, etc.

17. **Advanced Machine Work.** The making and use of special tools and fixtures, standard plugs and collars, standard caliper and limit gauges; error limits in modern machine construction; methods of testing the accuracy of machine tools, etc.

Summer Term. The Summer Term in Shopwork will begin on Monday morning preceding Commencement Day and continue for four weeks. The courses open to students are Shopwork (4) (7) (11) (13) (14) and (15), three credit hours in each.

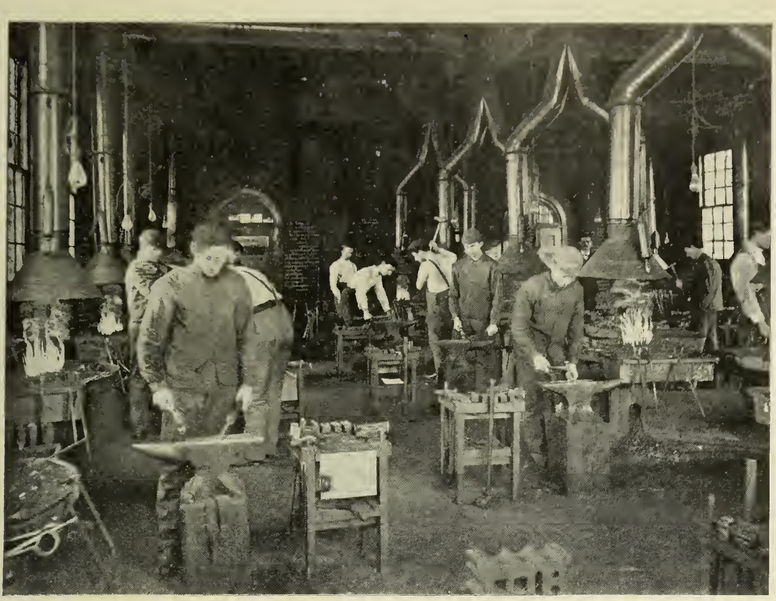
Each course requires three hours a day for six days a week. Students electing the Electrical or Mechanical Engineering Courses are required to take two of the three courses, Shopwork (4) (7) and (11) at the close of their first year.

Students electing the Chemical Engineering Course are required to take Shopwork courses (7) and (11) at the close of their first or second year.

The courses are open as elective to students who desire to lighten their work of the regular terms, to make up back work or to take extra work.

SHOPWORK REQUIRED

Number	Credit hours	Subject	Year	Term.	Hours	Courses in
3	2	Founding	2	1	Th. 1-5; or S. 8-12	Mech. Eng.
3	2	Founding	2	1	Tu. 1-5.	Short Ind. Arts.
3	3	Founding	2	1	M. 2-4; Tu. 1-5.	Ind. Arts; Manual Train.
4	2	Chipping and Filing	1	3	M. Tu. 1-3	Short Clayworking.
4	3	Chipping and Filing	2	1	F. 1-4; S. 9-12	Short Ind. Arts.
4	3	Chipping and Filing	....	....	(See Courses)	Elec. Eng.; Mech. Eng.
4	3	Chipping and Filing	4	1	M. Tu. 1-4	Ceramics.
4	3	Chipping and Filing	3	1	M. Tu. 1-4	Ind. Arts.
4	3	Chipping and Filing	3	1	M. Tu. Th. 10-12	Manual Train.
7	2	Woodworking	2	1	M. F. 10-12	Mining Eng.
7	3	Woodworking	1	1	M. Tu. 1-4	Short Ind. Arts.
7	3	Woodworking	2	1	W. Th. 1-4	Manual Train.
7	3	Woodworking	2	1	F. 1-4; S. 8-11	Ind. Arts.
7	3	Woodworking	....	....	(See Courses)	Chem., Elec. and Mech. E.
8	3	Cabinet Work	2	3	M. Tu. 1-4	Ind. Arts; Manual Train.



INDUSTRIAL ARTS DEPARTMENT—FORGE ROOM

INDUSTRIAL ARTS DEPARTMENT—FOUNDRY

SHOPWORK REQUIRED—Concluded

Number	Credit hours	Subject	Year	Term	Hours	Courses in
9	3	Adv. Pattern work	1	2	M. Tu. 1-4	Short Ind. Arts.
9	3	Adv. Pattern work	2	2	M. Tu. 1-4	Ind. Arts; Manual Train.
9	3	Adv. Pattern work	....	....	(See Course)	Mech. Eng.
11	3	Forging	....	..	(See Courses)	Chem., Elec & Mech. Eng.
11	2	Forging	2	2	M. F. 10-12	Mining Eng.
11	3	Forging	2	2	F. 1-4; S. 8-11	Ind. Arts; Manual Train.
11	3	Forging	1	3	M. Tu. Th. 10-12	Short Ind. Arts.
11	3	Forging	1	3	M. Tu. 1-4	Short Mining.
11	3	Forging	1	3	W. Th. 1-4	Short Clayworking
11	3	Forging	3	3	W. Th. 1-4	Ceramics.
12	3	Adv. Forging	2	3	F. 1-4; S. 8-11	Ind. Arts; Manual Train.
13	3	Machine Work	2	2	M. Tu. 1-4; or W. Th. 1-4; or F. 1-4, S. 8-11.	Elec. Eng.
13	3	Machine Work	3	2	M. Tu. 1-4	Manual Train.
13	3	Machine Work	3	2	M. Tu. Th. 10-12	Ind. Arts.
13	3	Machine Work	2	2	W. Th. 1-4	Short Ind. Arts.
13	3	Machine Work	2	3	M. Tu. 1-4; or F. 1-4, S. 8 11	Mech. Eng.
14	3	Adv. Machine Work	3	1	M. Tu. W. 8-10; or Th. F. S. 8-10	Elec. Eng.
14	3	Adv. Machine Work	3	1	M. Tu. Th. 8-10; or M. Tu. 1-4	Mech. Eng.
14	3	Adv. Machine Work	2	3	Th. F. 1-4	Short. Ind. Arts.
14	3	Adv. Machine Work	3	3	M. Tu. Th. 8-10	Manual Train.
14	3	Adv. Machine Work	3	3	M. Tu. 1-4	Ind. Arts.
15	3	Adv. Machine Work	4	1	F. 1-4; S. 8-11	Ind. Arts; Manual Train.
15	4	Adv. Machine Work	3	2	M. Tu. Th. F. 10-12; or Th. 2-4, F. 1-4, S. 9-12	Mech. Eng.
16	3	Adv. Machine Work	4	2	M. W. F. 8-10	Ind. Arts; Manual Train.
17	3	Adv. Machine Work	4	3	M. Tu. 1-4	Ind. Arts.

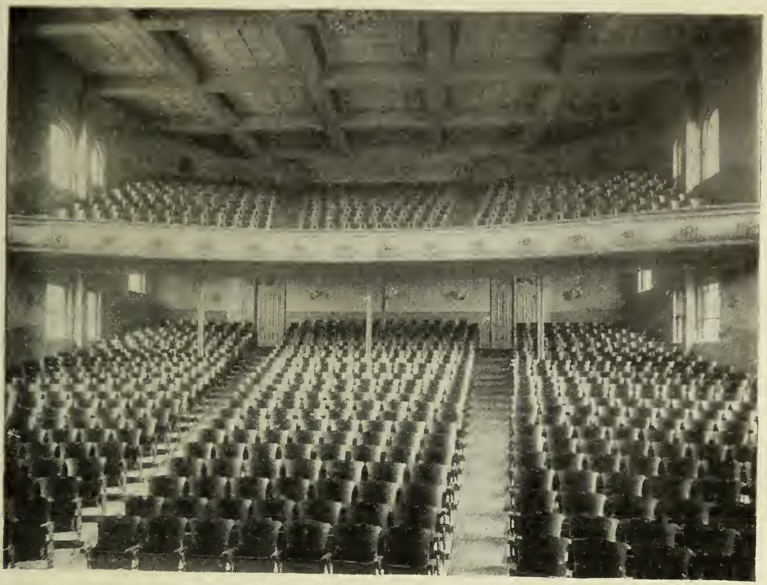
SPANISH

(DEPARTMENT OF ROMANCE LANGUAGES AND LITERATURES)

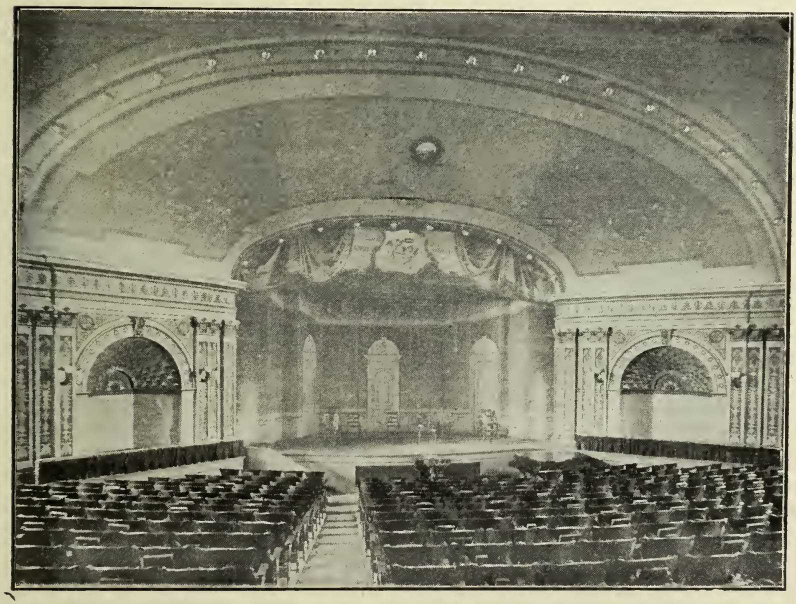
Office, University Hall, Room 35

Professor Bowen, Assistant Professor Batchelder

1. **Elementary Spanish.** Grammar and reader; modern stories and plays; composition and conversation. Four times a week. (First, second and third terms, M. Tu. Th. F. 11; or Tu. W. Th. F. 3. Offered as an alternative with French 1 and German 1 to those who enter with full or partial credit in Latin or Greek or without previous language training.)



AUDITORIUM



THE UNIVERSITY POWER PLANT

The buildings comprising the power plant were completed in 1896, and with the machinery installed, form a model plant. The boiler room is 38x100 feet, and is equipped with six 150 H. P. Babcock & Wilcox boilers, with four Murphy Automatic Stokers and two Babcock & Wilcox chain grates. The plant is provided with coal handling machinery.

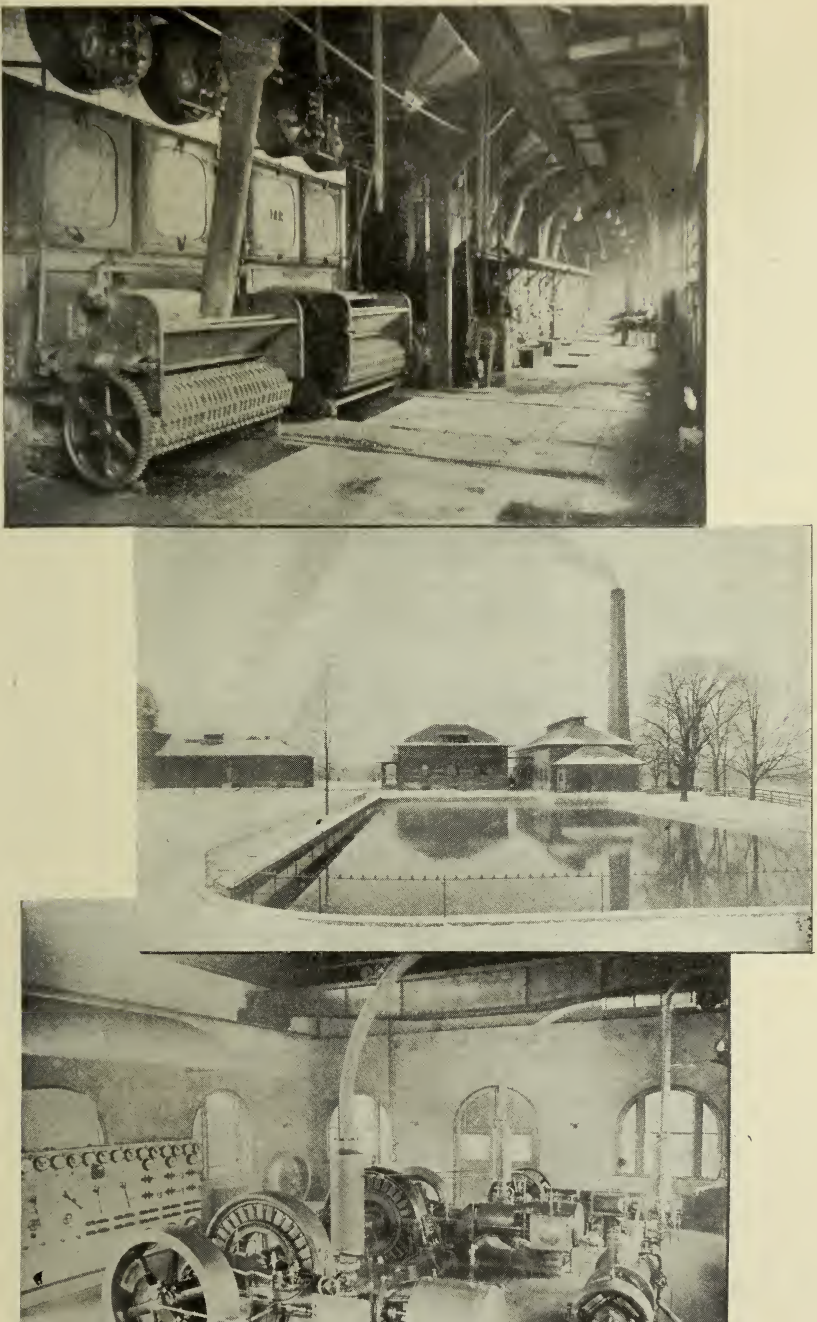
The coal house is at one end of the boiler house; at the other end is the pump and receiver pit, from which runs the tunnel (about 4,300 feet in length) to the various buildings on the campus. In this tunnel are the heating mains, gas and water mains, power, light and other wires.

The power house is separated from the boiler house by a 15-foot alley. This building is 40x60 feet in the clear with 20 ft. side walls. The power generating plant consists of one 70 H. P. McEwen tandem compound engine, belted to a 60 K. W. 2-phase Westinghouse A. C. generator, and two 200 H. P. Watertown tandem compound engines, direct connected to two 125 K. W. 2-phase Westinghouse A. C. generators. There is also a 25 H. P. standard Westinghouse engine, direct connected to a 15 K. W. Westinghouse D. C. generator for exciting the alternators. The switch board, nine panels of Blue Vermont marble, is provided with the latest type of long scale, dead beat volt and ammeters, polyphase wattmeter, ground detector and Lincoln synchronizer for paralleling the alternators. The station is also provided with a ten-ton traveling hand crane.

The condensers are located in the basement of the power station, the cooling water coming from a reservoir near the station, having a capacity of 500,000 gallons. All the power transformers are in the basement; they convert from 1,100 volts, as generated by the machines, to 440 volts; the current is then distributed to 19 motors in as many different places about the campus. There are installed over two thousand eight hundred incandescent lamps, twenty-five arc lamps and about 250 H. P. in motors. The electric plant is Westinghouse throughout. The buildings are brick. Nearly all the buildings on the campus are heated and lighted from this plant. The total cost of this plant for generation of power, heat and light, and for its transmission to the buildings, is $112,000.

The views on the opposite page show the interiors of the boiler house and engine house above and below; and in the center, a view of the whole plant, looking west across the reservoir.

During the year 1900 a very excellently equipped experimental steam boiler of 100 H. P. capacity was donated to the University by Dr. Stillman W. Robinson, Emeritus Professor of Mechanical Engineering. This boiler, one of the most complete things of the kind ever erected, has been located in the Boiler House, but belongs to the Experimental Engineering Laboratory of the Department of Mechanical Engineering, and is under its supervision and control. This gift, for the special prosecution of experimental research, adds greatly to the opportunities offered to students by the already extensive power and electric plants.



RECENT ASTRONOMICAL EQUPIMENT

The Board of Trustees decided, during the summer of 1902, to increase the equipment of the Emerson McMillin Observatory along the lines of instruction in geodetic astronomy so as to bring it into the first rank. With this in view a large, well lighted lecture room was added, leaving the computing room free at all times for students. Two observing rooms, a zenith telescope and theodolite house were added and the equipment purchased.

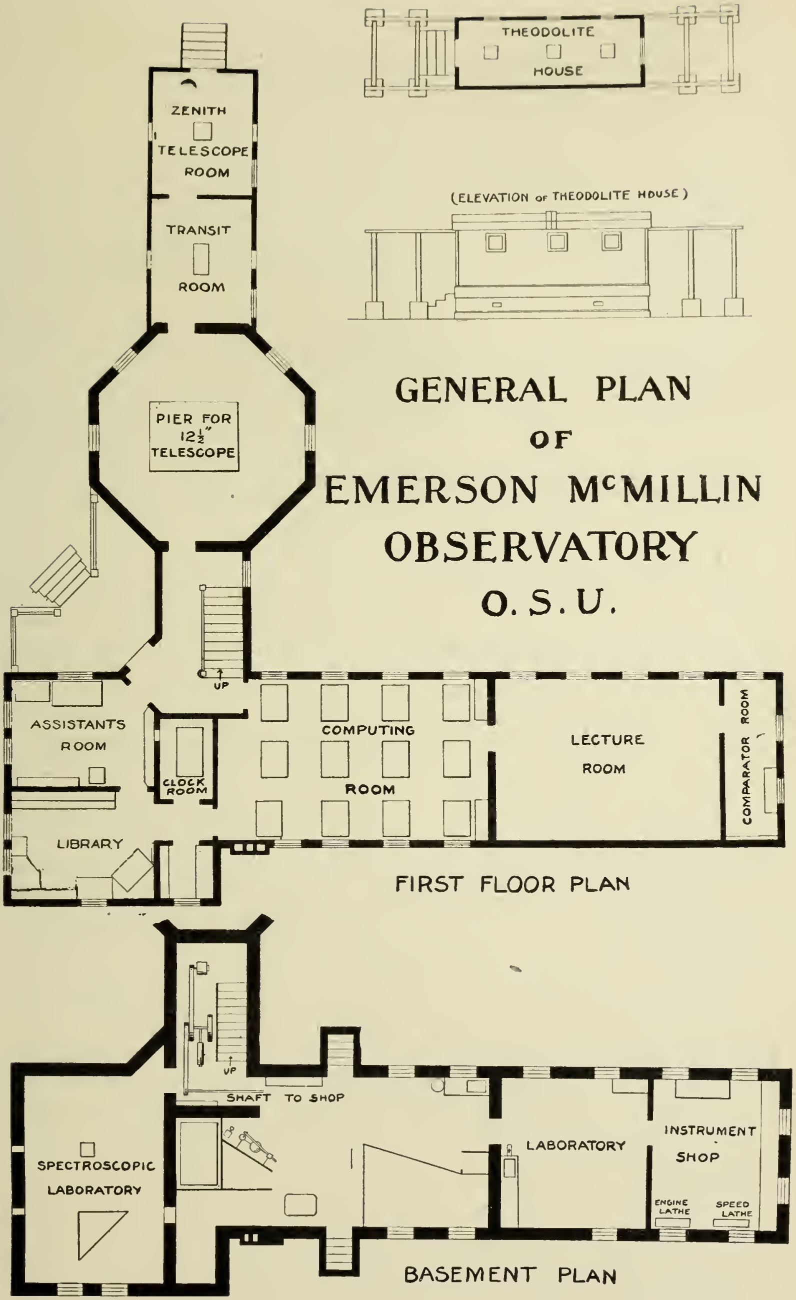
An extended survey rests upon three fundamental problems of astronomy, namely, the determination of latitude, of longitude (time) and of azimuth or the direction of a line on the earth's surface. The equipment of this observatory enables each of these to be studied by a graded series of methods, from those suitable for recognizance to the most refined methods of the United States Geodetic Survey.

For the first, the Observatory is provided with six sextants, two small theodolites, five chronometers and a standard clock by Riefler. For accurate time, Mr. McMillin's gift provided an excellent 3-inch combined portable transit and zenith telescope by Saegmuller and chronograph by Warner & Swasey. For accurate latitude work there is the above and in addition a 2½ inch, zenith telescope by Troughton & Simms. For refined azimuth determinations there is a theodolite by Troughton & Simms equipped with 12″ horizontal and vertical circles read by micrometer microscopes to single seconds of arc.

The plan of the buildings and elevation of the theodolite house are shown on the opposite page. The two rooms on the west are of light frame structure for perfect ventilation. One contains the transit and one the zenith telescope. Each of these rooms is provided with the usual shutter giving a clear view of the meridian from horizon to horizon. The theodolite house, also of frame construction, has a roof which separates in the middle, each half rolling back out of the way, giving a clear view of the heavens to within about 25 degrees of the horizon. In this building are three piers to carry the three theodolites. About 200 feet west of this is a pier upon which are mounted three collimating telescopes, each pointig to its proper theodolite, and serving as fixed marks.

Ten students can be at work each clear night under constant supervision of the instructor. Every effort has been made to reduce the inconvenience of open air observing to a minimum in order that the student may concentrate his entire attention on the problem in hand and not have his mind constantly distracted by those petty annoyances always present with work in the field.

The course offered embraces, in addition to the field work, the theory of the adjustment of observations, including that of a quadrilateral, and the solution of the geodetric triangle, and a brief summary of base line measurements. In all the teaching, the aim is rather to give a mastery of fundamental principles than to accumulate a mass of half understood measurements.



GENERAL PLAN OF EMERSON McMILLIN OBSERVATORY O. S. U.

(ELEVATION of THEODOLITE HOUSE)

FIRST FLOOR PLAN

BASEMENT PLAN

STUDENT ORGANIZATIONS

Religious. One of the most commendable organizations in the University is a branch of the International Young Men's Christian Association, organized in 1883. It has a house and a large membership. Prospective students are invited to write for information concerning board, rooms, employment, etc., to its General Secretary, 1610 Highland St., Columbus.

Literary. There are five literary societies in the University, three of which are open to young men. These are the Alcyone Literary Society, founded in 1874; the Horton Literary Society, founded in 1875, and the Athenian Literary Society, founded in 1896. Each of these societies has commodious and well furnished apartments in University Hall. They meet weekly, and their work gives a very desirable training in composition, public speaking, and parliamentary order. It is of special value to students in the technical courses, where the prescribed work includes but little training of this kind.

Technical. The Engineering Society, Chemical Association and Ceramic Association are organizations composed of instructors and students who meet to read and discuss questions of special interest. They aim to assist the students as early as possible in their course to begin the habit of accurate observation and description of engineering work wherever it may be met; also to develop the habit of constant study of periodical engineering literature and to stimulate among all classes of engineers an intelligent appreciation of the great works of engineering of every age and of every kind.

Athletic Association. An important factor in the physical development of the students is the University Athletic Association. Its Athletic Board is composed of the Secretary of the Board of Trustees, three members from the Faculty, three from the Alumni, and four from the student body. This board has complete charge of all intercollegiate events and does all in its power to promote base-ball, foot-ball, tennis, basket-ball, and track and other athletics.

Miscellaneous. There are numerous other organizations, membership in nearly all of which is open to all students. Their various objects are sufficiently indicated by the following titles: the Biological Club, the Political Science Club, the Sketch Club, the English Club, the Dramatic Club, the Glee Club, the Mandolin and Guitar Club, the Banjo Club, the Orchestra, the Male Quartet and the chorus.

THE UNIVERSITY AND THE HIGH SCHOOLS

The University has appointed a High School Visitor and invites the co-operation of Boards of Education, superintendents, principals and teachers in so adjusting the work of students that those desiring to enter the University may do so with the least possible loss of time and preparation. Reference is here made to the entrance requirements of the several colleges of the University and the value in units of the several subjects as set forth in the college bulletins and in the Annual Catalogue of the University. The statement of principles and method of procedure are set forth in the following articles adopted by the General Faculty:

(1). That until any High School of this State is inspected or reported upon by the High School Visitor and acted upon by the High School Committee, the status of certificates of that school shall continue as heretofore.

(2). That as fast as schools are reported on by the High School Visitor and action taken thereon by the High School Committee the certificate privilege in the case of all rejected schools be at once terminated, and the Deans of the various colleges of the University be furnished with lists of such rejected schools (as well as approved schools).

(3). **Accredited Schools.** Those four year secondary schools whose courses of study offer such branches as prepare students for all colleges of the University.

All graduates holding certificates from this class of schools will be admitted to any college of the University without examination.

(4). **Recognized Schools.** Those three year or four year secondary schools whose courses of study do not prepare students for all colleges of the University, but include not less than 16 units of secondary instruction.

Any graduate holding a certificate from one of these schools will be admitted without examination to any college of this University, for which he is prepared.

A certificate from a recognized school when presented by a graduate thereof will be accepted toward admission by any college of the University; but an applicant holding such a certificate will be subject to examination in the requirements for admission not covered by the certificate.

(5). No school shall be placed in either class until visited and reported to the High School Committee whose duty it shall be to determine whether the conditions and quality of the work in the school will warrant placing it in either of the above classes.

No applicant shall be admitted by certificate to any college of the University who is not a graduate of the High School from which he bears a certificate; but an applicant for admission to the College of Pharmacy who brings a certificate showing that he has completed at least three years of work in an accredited school may be admitted without examination in the subjects covered by this certificate.

The foregoing provisions do not apply to the College of Veterinary Medicine or to such courses as do not lead to a degree.

MODES OF ADMISSION

Applicants for admission to the College of Engineering must be at least 17 years of age. They must be provided with testimonials of good moral character from their last instructor. If they have previously attended any other college or university, they must present a letter of honorable dismissal therefrom. They must also give evidence of proficiency in the studies required for admission (See page 109), either by certificate or examination.

Certificates. Certificates will be accepted, in place of examination, for those studies covered by them, when presented by graduates of such High Schools, Academies and Normal Schools in Ohio as are on the list of "accredited" or "recognized" schools. (See page 107.)

Certificates, to be considered, must contain a detailed statement of the studies pursued, the text book used, the amount of work done in each study, the amount of time devoted to it and the applicant's rank or standing. Blank forms for such certificates will be furnished on application.

All certificates will be passed upon by officers of the College of Engineering, and where certificates are received prior to September 1, applicants will be notified by mail, of the subjects, if any, upon which their certificates will be accepted in lieu of examination. In those subjects in which credit is not allowed, the regular entrance examination must be passed. Certificates sent in later than September 1 will be given the same consideration as those received earlier, but the College will not undertake to reply by mail and delay in matriculation may result.

Examinations. Except where a certificate gives credit for entrance work, examinations must be passed in the subjects stated on page 109. Applicants will be required to pass the examinations who present no certificates or who present certificates which cannot be accepted. Also applicants, graduates of "recognized" schools, must pass examinations in those subjects necessary for admission and not covered by their certificates.

The entrance examinations for the college year of 1903-04 will be held on Monday and Tuesday, June 22 and 23, 1903, and again on September 21 and 22, 1903.

The entrance examinations for the college year 1904-05 will be held on June 20 and 21, 1904, and again on September 19 and 20, 1904.

Plans should be made to take examinations at the assigned dates, but examinations not taken in the regular period may be taken thereafter subject to the convenience of the Professor in charge.

REQUIREMENTS FOR ADMISSION TO THE FOUR YEAR COURSES

Applicants to be admitted to full standing in this College must obtain credit by examination or certificate for the necessary number of units chosen from the list given below, subject to the printed restrictions; for the college year of 1903-04 credit for sixteen hours is necessary; for the college year of 1904-05 credit for nineteen hours is necessary. Applicants slightly in arrears may be admitted to Freshman work subject to certain entrance conditions as set forth on page 110.

The extent and character of the work required for credit in each subject mentioned in the following list will be found on pages 111 to 114.

GROUP A. ENGLISH

Three units chosen from the following:

(1)	English Composition and Rhetoric	2 units
(2)	English Classics	1 unit
(3)	English Literature	1 unit

GROUP B. HISTORY

Three units chosen from the following:

(4)	Civil Government	1 unit
(5)	United States History	1 unit
(6)	General History	1 unit
(7)	Greek and Roman History	1 unit
(8)	English History	1 unit

GROUP C. MATHEMATICS

Four units as follows. No conditions are permitted in Mathematics:

(9)	Algebra	2 units
(10)	Geometry	2 units

GROUP D. SCIENCE

Three units chosen from the following, including Physics:

(11)	Physics	2 units
(12)	Physical Geography	1 unit
(13)	Botany	1 unit
(14)	Chemistry	2 units
(15)	Physiology	1 unit
(16)	Zoology	1 unit
(17)	Geology	1 unit
(18)	Astronomy	1 unit

Group E. FOREIGN LANGUAGE

For 1903-1904, three units chosen from the following list:

(19)	Latin	1½ or 3 units
(20)	Greek	1½ or 3 units
(21)	French	1½ or 3 units
(22)	German	1½ or 3 units
(23)	Spanish	1½ or 3 units

For 1904-1905, six units chosen from the following list, or three units from this group, together with three extra units chosen from Groups A, B. C and D.

(19)	Latin	3 or 6 units
(20)	Greek	3 or 6 units
(21)	French	3 or 6 units
(22)	German	3 or 6 units
(23)	Spanish	3 or 6 units

A modern language is preferred, but Latin or Greek will be accepted. Those entering college with Latin or Greek will be required to begin a modern language in the first year of their course. Those entering with a modern language will be required to continue the same language in their first year.

ENTRANCE CONDITIONS

No applicant under twenty-one years of age will be admitted to the College of Engineering who is in arrears more than two units in entrance requirements; no deficiencies are allowed in Mathematics. Thus for 1903-04 he must have 14 units out of the 16 required for unconditional admission; and for 1904-05 he must have 17 units out of the 19 required for unconditional admission. An applicant twenty-one years of age or over, who is deficient in foreign language training, will be admitted with this deficiency in addition to the two units permitted above.

For those who have conditions in foreign language to remove, the following arrangements will be made:

1. Those entering with a partial credit in Latin or Greek will be permitted to make good their deficiency by doing an equivalent amount of work in a modern language in the college. For this work they will receive no college credit.

2. Those twenty-one years of age or over, entering with no training in language, will be permitted to make good their deficiency by beginning a modern language in the college. For this work they will receive no college credit.

REMOVAL OF ENTRANCE CONDITIONS

All entrance conditions must be removed by the end of the second year, and by examination under University officers. Certificates will not be received for entrance conditions after matriculation.

EXTENT AND CHARACTER OF SUBJECTS FOR ENTRANCE

GROUP A—ENGLISH

Three units are required.

(1) **English Composition and Rhetoric.** *Two units.* Each applicant will be tested as to his ability to write clear and correct English. The test will be the writing of several brief essays, of which one will be upon a subject drawn from the applicant's observation or experience, and the others upon topics requiring a knowledge of the books in the (2) English Classics. The amount and kind of work required is indicated in Scott and Denney's Composition-Rhetoric.

(2) **English Classics.** *One unit.* The following books, or equivalents, should be read with sufficient care to insure a knowledge of their story-plot, or argument, their chief incidents, and their principal characters: Shakespeare's Merchant of Venice, Julius Caesar, and Macbeth; Milton's Lycidas, Comus, L'Allegro, and Il Penseroso; Burke's Conciliation with the Colonies; Macaulay's Essays on Milton and Addison; The Sir Roger de Coverly Papers in The Spectator; Goldsmith's The Vicar of Wakefield; Coleridge's The Ancient Mariner; Scott's Ivanhoe; Carlyle's Essay on Burns; Tennyson's The Princess; Lowell's The Vision of Sir Launfal; George Eliot's Silas Marner.

(3) **English Literature.** *One unit.* Scudder's English Literature, Johnson's History of English and American Literature or the Introductions by Pancoast, Painter, Halleck, or Newcomer; together with the reading of representative works of literature.

GROUP B—HISTORY

Three units are required.

(4) **Civil Government.** *One unit.* Fiske's Civil Government, or equivalent. No credit or certificate given for this when studied incidentally to U. S. History.

(5) **United States History.** *One unit.* Johnson's High School History of the United States, McLaughlin's History of the American Nation, Montgomery's Students' American History, or equivalent. No credit given on certificate for work below the 9th grade.

(6) **General History.** *One unit.* Adams' European History, Myers' General History, or equivalent.

(7) **Greek and Roman History.** *One unit.* Botsford's History of Greece and History of Rome, or equivalent.

(8) **English History.** *One unit.* Montgomery's Leading Facts of English History, or equivalent.

GROUP C—MATHEMATICS

Four units are required. No conditions allowed.

(9) **Algebra.** *Two units.* *Taylor's "Elements of Algebra" or an equivalent.

First unit. Special attention should be given to the four fundamental operations, linear equations (single and in systems), factoring, highest common factor, lowest common multiple, fractions, and fractional equations, involution, evolution, surds and complex quantities; quadratic equations solved by factoring, by completing the square, and by the general formula.

Second unit. A thorough review of the work of the first unit, irrational equations, simultaneous quadratic equations, higher equations solvable by factoring, ratio, proportion, progressions, theory of exponents, binominal theorem for positive integral exponents and the use of five-place tables of logarithms.

(10) **Geometry.** *Two units.* Venable's, Wells', Wentworth's, White's, Beman and Smith's, or equivalent.

First unit. Plane Geometry with solution of originals.

Second unit. Solid and Spherical Geometry with solution of originals.

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* The student in an engineering course is badly crippled unless he can use his mathematics with confidence, accuracy and rapidity. He should be able to perform any operation and solve any ordinary problem in the above list of subjects and determine the correctness of his results. This skill can only be acquired by practice.

The student intending to enter the Engineering College is advised to review his Algebra, making it a point of honor to solve every exercise in the text book used. If his high school work has been well done, and if he posesses the mathematical ability, together with that self-reliance and determination without which he cannot succeed as an engineer, he should be able to make this review with little or no assistance.

GROUP D—SCIENCE

Three units are required, including Physics.

(11) **Physics.** *Two units.* Carhart and Chute, Gage, Avery or an equivalent.

(12) **Physical Geography.** *One unit.* Geikie's Elementary Lessons or its equivalent.

(13) **Botany.** *One unit.* Kellerman's Elementary Botany and Spring Flora, or equivalent.

(14) **Chemistry.** *Two units.* Remsen's Introduction to the Study of Chemistry or equivalent. For laboratory work, McPherson's Laboratory Exercises, arranged to accompany Remsen's Chemistry or equivalent.

(15) **Physiology.** *One unit.* Martin's Human Body (brief course) or equivalent. No credit given on certificate for work done below the ninth grade.

(16) **Zoology.** *One unit.* Jordan and Kellogg's "Animal Life"; Kellogg's "Elementary Zoology"; Davenport's "Introduction"; or equivalent, with laboratory work or field work.

(17) **Geology.** *One unit.* Brigham's, Dana and Rice's (revised), Tarr's or LeConte's, or equivalent, supplemented by study of the geological phenomena and formations found in the vicinity of the school.

(18) **Astronomy.** *One unit.* Young's Lessons in Astronomy, Comstock's Text-Book of Astronomy, or equivalent.

GROUP E—*FOREIGN LANGUAGE, 1903-04

For 1903-04, three units are required.

(19) **Latin.** *Three units.*

One and one-half units. Pronunciation (the Roman method); grammar (an exact knowledge of the inflections).

One and one-half units. Caesar, first four books of the De Bello Gallico.

(20) **Greek.** *Three units.*

One and one-half units. Grammar (Goodwin's preferred) and prose composition; or the first 100 lessons in White's Beginner's Greek Book.

One and one-half units. The first three books of Xenophon's Anabasis.

(21) **French.** *Three units.*

One and one-half units. Grammar, elementary reading and composition, pronunciation.

One and one-half units. French prose reading, advanced composition.

(22) **German.** *Three units.*

One and one-half units. Grammar, elementary reading and composition, pronunciation.

One and one-half units. Reading of German literature, advanced composition.

(23) **Spanish.** *Three units.*

One and one-half units. Grammar, elementary reading and composition, pronunciation.

One and one-half units. Reading of modern Spanish texts, advanced composition.

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*A knowledge of *one* language other than English is required for admisson. French or German is preferred, but Latin, Greek or Spanish will be accepted. Students preparing for an Engineering Course are advised to take as early an opportunity as possible to begin the study of a modern language. Those entering with French, German or Spanish only will be required to pursue the same language, taking advanced work, during their first year.

GROUP E—*FOREIGN LANGUAGE, 1904-05

For 1904-05, six units are required from this group; or three units from this group and three extra units chosen from Groups A, B and D.

(19) **Latin.** *Six units.*

Three units. Pronunciation (the Roman method); grammar (an exact knowledge of the inflection); Caesar, the first four books of De Bello Gallico.

Three units. Cicero, six orations including Pro Lege Manilia; Virgil, the first six books of the Aeneid with prosody; prose composition, Daniell, Collar, Jones or Dodge and Tuttle.

(20) **Greek.** *Six units.*

Three units. Grammar (Goodwin's preferred) and prose compositions, or the first 100 lessons in White's Beginner's Greek Book; the first three books of Xenophon's Anabasis.

Three units. Fourth, fifth and sixth books of the Anabasis, three books of Homer's Iliad, and additional reading.

(21) **French.** *Six units.*

Three units. Grammar, pronunciation, advanced prose composition, modern prose reading.

Three units. Sight reading, French of the Seventeenth Century and later, writing short essays in French, conversation.

(22) **German.** *Six units.*

Three units. Grammar, pronunciation, advanced prose composition, reading easy German literature.

Three units. German literature, prose and ballads and lyrics; sight reading, composition, oral exercises.

(23) **Spanish.** *Six units.*

Three units. Grammar, pronunciation, reading of modern Spanish texts, advanced composition.

Three units. Sight reading of difficult prose and poetry, writing short essays in Spanish, conversation.

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* A knowledge of at least one language other than English is required for admission. Students preparing for an Engineering Course are advised to take as early an opportunity as possible to begin the study of a modern language. Those entering with six units in any one language and those entering with three units in Latin or Greek and with three extra units from other Groups may select the modern language of their first year. Those entering with three units of a modern language and with three extra units from other groups must pursue the same modern language, taking advanced work, during their first year.

REQUIREMENTS FOR ADMISSION TO THE SHORT COURSES

Applicants must not be less than seventeen years of age, and, unless they are over twenty-one years of age, must pass examinations in Arithmetic and Geography, and must be able to write a business letter or a short theme correct in Grammar and Orthography; or they must present satisfactory certificates showing that they have successfully pursued these subjects elsewhere. In addition, each applicant under twenty-one years of age must present a letter or certificate showing that he has had at least one year's practical experience in some industry related to the course which he wishes to pursue.

Applicants over twenty-one years of age are admitted without examination, and without letter or certificate of practical experience.

ADMISSION AS SPECIAL STUDENTS

Students who desire to pursue special lines of work in the University, and do not desire to become candidates for degrees, will be admitted on the following conditions:

1. The regular entrance requirements must be satisfied.

But applicants who are not less than twenty-one years of age, after obtaining credit for elementary or "grade" work, and for such other subjects as may be necessary to qualify them for the classes that they wish to enter, may, on the presentation of satisfactory reasons, be admitted by the Faculty to any class in the College; provided, that if any student who has been admitted on these conditions afterwards becomes a candidate for a degree, he shall take the omitted entrance examinations at least two academic years before the degree is conferred.

2. On entering the College, students desiring to pursue special work are required to lay before the Faculty, for approval or modification, a written statement of the end they have in view, the studies proposed for the attainment of that end, and the probable period of attendance. Such students will be held as strictly to their accepted schemes of work as are the regular undergraduates to their courses of study.

3. Permission to enter as special undergraduates will be refused to all who fail to give satisfactory evidence of definiteness of purpose and will be withdrawn whenever the conditions on which it was granted cease to exist.

ADMISSION TO ADVANCED STANDING

1. Applicants who do not come from some other University or College must first obtain admission in the manner already described. They will then be examined on the undergraduate studies for which they ask credits.

2. Applicants who have completed at least one year's work in an approved College, and who bring explicit and official certificates describing their course of study and scholarship, and also letters of honorable dismission, will be admitted without examination, except such as may be necessary to determine what credit they are to receive here for work done in the College from which they come.

ATTENDANCE

Registration. All students are required to register and pay their term fees on or before the first day of each term (See Days and Dates, page 2) between the hours of 8:00 a. m. and 12 m., or between 1:00 and 4:00 p. m., central standard time.

Former students who fail to register as above will be charged one dollar in addition to the usual incidental fee, for the first day of delinquency, and fifty cents additional for each subsequent day.

No candidate for graduation will be permitted to register for the second term of his graduating year, except upon presentation to the Bursar of the President's certificate that his thesis subject has been announced and approved.

Amount of Work. No student is permitted to take less than fifteen credit hours a week of any sort of work, except by special permission, and no student will be permitted to take more than the regular work of the class to which he belongs, who has not passed all his work for the preceding term.

Credit Hour. "Two consecutive hours of practical or experimental work in any department shall be regarded as the equivalent of one hour of class-room exercise; but when no outside work is required in addition to the laboratory work, then three hours of laboratory work may be required as equivalent to one credit hour; and in general not more than three hours of the student's time, including class-hours, shall be required for each credit hour."

Elective Studies. All elections of work in continuous studies, when once made, are understood to be made for the entire collegiate year.

The right is reserved to each professor to withdraw the offer of any elective study when it is not chosen by at least four persons.

Consultation. For consultation or information regarding work in any class or department, students will apply to the professor or instructor in charge.

For consultation or information in regard to their status as members of the College of Engineering, or for the filing of petitions, changes of course, changes of class cards, adjustment of schedules and similar needs, students will apply to the Secretary, who can be found every school day at his desk in the faculty room, University Hall, from 9 to 10 a. m.

On matters affecting their connection with the University, or in any way connected with the discipline of the institution, students will apply to the President of the University.

Probation. At the close of any term a student failing to pass in two-thirds of his work will be considered on probation for the next three terms; and a second similar failure incurred while thus on "probation" will forfeit his connection with the University.

The Convocation. An entire hour is devoted to a convocation at which the President presides. It is held in the Auditorium of University Hall at 10 o'clock on Wednesday of each week. In addition to devotional exercises, an address is delivered upon some suitable topic. During this hour the libraries and laboratories are closed and no other University exercises occur. It is expected that the Faculty and students will attend. The public is always welcome at the Convocation.

GRADUATION

Thesis. As a requisite for graduation, each candidate must present an acceptable thesis, embodying the results of a special study. The subject of this study must lie within the field of the degree sought. The subject must be filed with the president of the University (dependent upon the approval of the head of the department), on the official blank provided for the purpose, not later than December 15 of the University year in which the degree is sought. (See also Registration, page 116.) The completed thesis must be submitted to the head of the department concerned not later than the second Saturday before Commencement Day.

The accepted thesis—on standard paper, as per sample in the Presidents office, typewritten or printed, neatly bound in black cloth, gilt-lettered on first cover with the thesis title, name of author, degree sought and year of graduation— must be filed not later than the Friday preceding Commencement Day.

Degrees. The degree of Civil Engineer in Architecture is conferred on those who have completed the course in Architecture; that of Engineer of Mines in Ceramics on those who have completed the Course in Ceramics; that of Bachelor of Science in Chemical Engineering on those who have completed the Course in Chemical Engineering; that of Civil Engineer on those who have completed the Course in Civil Engineering; that of Mechanical Engineer in Electrical Engineering on those who have completed the Course in Electrical Engineering; that of Bachelor of Science in Industrial Arts on those who have completed the Course in Industrial Arts, or the Course in Manual Training; that of Mechanical Engineer on those who have completed the Course in Mechanical Engineering; that of Engineer of Mines on those who have completed the Course in Mining Engineering.

The degree of Doctor of Mechanical Engineering, Doctor of Civil Engineering or Doctor of Electrical Engineering is conferred upon holders of the Stillman W. Robinson Fellowship in Engineering who successfully complete its two year course of graduate research work; and the corresponding Master's degree upon holders of the same fellowship, who successfully complete its one year course of graduate research work.

Except by unanimous consent of the Faculty, no candidate for graduation will be recommended for a degree whose record is not in all respects complete by the Friday evening previous to the Commencement Day on which he seeks the degree.

THE STILLMAN W. ROBINSON FELLOWSHIP IN ENGINEERING

The Stillman W. Robinson Fellowship in Engineering recently endowed by Emeritus Professor Robinson for the encouragement of graduate research work in engineering, provides three hundred dollars ($300.00) annually, and is open to graduates in Mechanical, Civil, and Electrical Engineering.

Any student to whom this Fellowship is awarded must devote his entire time to the work, which shall amount at least sixteen hours per week, of which at least eight shall be in the line of original research or investigation.

This Fellowship will be awarded on the Friday preceding Commencement Day. All applications must be filed with the committee on or before the first of June of the same year, and must include a general outline of the course of study and research proposed. This must show a definite object to be attained.

The application may be for one or two years, preference being given to candidates electing the two year course.

No one will be registered for this graduate course of research who does not satisfy the committee of the Faculty that he has the necessary capacity, fitness and preparation to pursue the work with advantage, and promise of ultimate success.

Great importance will be attached not only to the course laid out to be pursued by the applicant, but to his personal fitness for the work and to his ability to prepare a dissertation or thesis respecting the same which shall be in every way a creditable production, and form a contribution to knowledge.

The investigation may consist of experimental research, or of mathematical analysis, but it usually will be expected to embrace both forms of study. By the beginning of the first year the student must have prepared and submitted a well defined course, and have registered as a fellow for this Fellowship. Throughout the course of study the student will proceed under the care of the professor who has charge of the line of work being pursued, the same consisting of occasional consultation, instead of recitations.

Students completing the two year graduate course under the conditions of this Fellowship will receive the degree of D. M.E., D. C.E., or D. E.E., according to the course taken.

Students electing and completing a one year course will receive the corresponding Masters degree.

The applications for this Fellowship; the approval of the course of study; the acceptance of the theses; and the recommendations for degrees, are to be passed upon by a committee of the Faculty consisting of the President of the University, the Dean of the College of Engineering, and the professors of Mechanical Engineering, Experimental Engineering, Civil Engineering, Electrical Engineering, and Mathematics.

EXPENSES

Fees. Each student is required to pay an incidental fee of eighteen dollars a year, and the usual fees for the expenses of laboratory work. Tuition is free.

Laboratory Fees.—Students in the laboratories and shops are required to pay fees to cover, in part, the cost of the material consumed, and the deterioration of the expensive instruments used by them. The fees charged per term in the laboratories mentioned below are as follows:

Ceramics, 9, 10, 11, or 18	$ 5 00
Drawing, 7	2 00
Electrical Engineering Laboratory, 3 hrs, or less, $5; over 3hrs	7 00
Gymnasium locker (if desired)	1 00
Mechanical Engineering, 12, 14, 15, 17, 24, 25, 27, 28, 29, 30, 35 or 36	5 00
Physics Laboratory, 3 hrs. or less, $5; over 3 hrs	7 00
Shop Work, 4 hrs. or less, $5; over 4 hours	7 00

In the laboratories of the Departments of Chemistry, Ceramics and Metallurgy, each student is required at the beginning of each term to pay a fixed charge of one dollar and fifty cents for gas and water. He is also required to buy his own supplies, which may be obtained at the store-room in Chemical Hall. With reasonable care, this expense need not exceed $5.00 per term.

All term dues must be paid at the opening of each term as a condition of admission to classes.

A fee of five dollars to cover expense of graduation, diplomas, etc., is required of each person receiving one of the ordinary degrees from the University, and this fee must be paid before the degree is conferred.

Note.—There are in contemplation certain changes in regard to the expenses. These include abolishing laboratory and shop fees as such and raising the incidental fee to $8 a term, $24 a year. Where it can be readily arranged, the student will pay for material used by him.

Other Expenses. There are two dormitories on the University grounds for the use of students. Each occupant is charged by the University a rent of one dollar and fifty cents a term.

The South Dormitory affords unfurnished rooms to such students as desire to board themselves, and thus to reduce their expenses to a minimum. The expense of living in this way falls below two dollars per week. Applications for room should be made to the President of the University.

The North Dormitory will accommodate more than sixty students. Board, furnished rooms, fuel, light and washing are, at present prices, supplied for about three dollars and twenty-five cents a week. Students will be admitted on special recommendation to the president of the University.

Boarding clubs are also formed in the neighborhood of the University. Furnished rooms are rented at seventy-five cents to one dollar a week for each student, and the cost of board is two dollars to three dollars a week.

Board, with furnished rooms, can be obtained in private families within convenient distances of the University, at rates varying from four dollars to five dollars a week. The ruling rate may be taken as four dollars.

The uniform with which the members of the battalion are required to provide themselves costs about fourteen dollars. It is quiet in pattern, and is designed to be worn daily in place of civilian dress.

The expense of a student in this College for a year may be estimated as follows, excluding clothing (except uniform) and traveling expenses:

	Low.	Average.	High.
Incidental fees	$18 00	$18 00	$18 00
Laboratory fees	15 00	15 00	54 00
Books and stationery	15 00	25 00	40 00
Room	4 50	37 00	75 00
Furniture	10 00	......	......
Board	70 00	110 00	150 00
Uniform	14 00	14 00	14 00
	$146 50	$219 00	$351 00

The second and third estimates for room include light, fuel and care. The third estimate is for a room occupied by a single student. The requirements for laboratory fees and books depend upon the course of study pursued.

Self Support. There is a large amount of work upon the University farm and in the shops and laboratories assigned to students, preference being given to those who are studying Agriculture or one of the Engineering courses. But the University cannot promise work to all applicants. Many students find work in private families, in offices and in various occupations, by means of which they defray at least a portion of their expenses. A person of ability and energy, who is master of a trade or who can do good work of any kind, can generally find remunerative employment. It has seldom been known that any student of ordinary energy and industry was obliged to leave the University because of a lack of money for necessary expenses, after having been sixty days on the ground—or long enough to inform himself as to the opportunities for securing employment. A student, devoting much time to earning his way, will be unable to carry successfully the full work of his class studies; such a student should plan to take five years at least to complete his course.

ENROLLMENT

APRIL 1st, 1903

STUDENTS IN FOUR YEAR COURSES LEADING TO DEGREES - -	594
STUDENTS IN SHORT COURSES NOT LEADING TO DEGREES - -	51
SPECIAL STUDENTS - - - - - - - - - - - - - -	22
TOTAL - - - - - - - - - - - - - - -	667

CLASSIFICATION BY COURSES

Name of Course Pursued	4th Year	3rd Year	2nd Year	1st Year	2nd Year, Short	1st Year, Short	Special	Total
Unclassified	....	....	.....	270	....	....	....	270
Architecture	2	5	4	Unclassified	....	....	1	12
Ceramics	....	5	8		5	10	2	30
Chemical Engineering	5	4	9		....	....	3	21
Civil Engineering.............	15	16	50		....	....	2	83
Electrical Engineering..... ..	9	26	51		....	....	....	86
Industrial Arts.......	....	....	1		5	20	....	26
Mechanical Engineering......	20	23	37		....	....	....	80
Mining Engineering...........	7	9	18		5	6	1	46
Special, Unclassified	....	....	.....	......	....	....	13	13
Total	58	88	178	270	15	36	22	667

NOTE:—For list of names, consult the General Catalogue of the University, which will be sent on application.

SUMMARY OF GRADUATES

Civil Engineers (C. E.)	107
Mechanical Engineers (M. E.)	73
Mining Engineers (E. M.)	55
Electrical Engineers (M. E. in E. E.)	109
Chemistry (B. Sc. in Chemistry)	17
Industrial Arts (B. Sc. in Ind. Arts)	2
Ceramics (E. M. in Ceramics)	4
Master of Science, Conferred by College of Engineering	2
Total Degrees Conferred	369
Names Counted Twice	8
Total Number of Graduates	361

DIRECTORY OF GRADUATES

APRIL 20, 1903

The faculty of the College of Engineering are anxious to place a copy of each annual catalogue in the hands of their graduates. They will esteem it a favor if any alumnus who changes his residence will notify the Secretary of the College of his new address and occupation. They will also be grateful for any information from any source, that may assist in making or keeping the Directory of the Alumni complete and correct.

A

Ackerman, Eli Osborn, 1884, C. E. Station "B," Columbus, Ohio.	Engineer, Maintenance of Way, Columbus Railway Company.
Ackerman, Fremont, 1883, C. E. Los Angeles, California.	Civil Engineer.
Aldrich, Edgar S., 1897, E. E. Moscow, Idaho.	Vice President and Manager, Moscow Electric Light & Power Co.
Alexander, Charles P., 1896, E. E. Canton, Ohio.	District Manager, Northwestern Mutual Life Insurance Co.
Alexander, St. Clair, 1893, E. E. Kansas City, Mo.	Stock Yards.
Alsdorf, Frederick C.,1892, E. M. Clifton, Arizona.	Superintendent, Stevens Copper Co.
Alsdorf, Percy Reed, 1896, E. M. Central City, Colorado.	In Standard Assay Office.
Arnold, Edwin Ebert, 1898, M. E. East Pittsburgh, Pa.	Engineer, Westinghouse Machine Company.
Atkinson, Warren, 1899, M. E. New York.	Maintenance Dept., New York Telephone Company.
Auld, James A., 1897, E. E. Columbus, Ohio.	With D. L. Auld.

B

Barcus, Miner, 1897, E. E. Schenectady, N. Y.	Assistant, Engineering Dept., General Electric Company.
Barlow, Moses Henry, 1901, C. E. Matoon, Ill.	In Maintenance of Way Dept., St. Louis Division, Big Four Ry.

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* Denotes "Deceased."

Barnaby, Charles L., 1898, C. E. Zanesville, Ohio.	Acting Assistant Engineer, C. & M. V. R. R.
Barringer, Lawrence E., 1902, E. M. (Ceramics.) Schenectady, N. Y.	In Research Dept., General Electric Company.
Barrows, Harry H., 1898, C. E. Birmingham, Ala.	Assistant Engineer, Alabama Great Southern Railway.
*Bartholomew, Clyde S., 1896, C. E.	Died June 23, 1900.
Beach, David Price 1895, C. E. Cincinnati, Ohio.	Assistant Engineer Maintainance of Way, P., C., C. & St. L. Ry.
Beck, Arthur Andrew, 1893, C. E. Columbus, Ohio.	Civil Engineer.
Beldon, Sanford Bonner, 1895, E. M. Pittsburgh, Pa.	Manager Pittsburg Office, Jeffrey Manufacturing Company.
Biebel, Herman M.,1896, E. E. Chicago, Ill.	Designing Electrical Engineer, Western Electric Company.
Bischoff, John Wallace, 1899, E.M. Robertsdale, Pa.	Superintendent, Rockhill Iron and Coal Company.
Bissing, William, 1893, E. E. New York.	Patent Attorney.
Blackburn, Frank H., 1896, E. E. Fostoria, Ohio.	Superintendent, Fostoria Incandescent Lamp Company.
Bleininger, Albert V., 1901, B. Sc., (Chem.) Columbus, Ohio.	Chemistry Instructor in Ceramics, Ohio State University.
Bloom, J. George, 1899, C. E. New Castle, Pa.	Division Engineer, New Castle Division, B. & O. R. R.
Bowden, Harry William, 1900, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Company.
Boehme, Adolph J., 1901, M. E. Youngstown, Ohio.	Engineer with the Youngstown Iron Sheet and Tube Co.
Bostwick Oliver N., 1902, C. E. Newark, Ohio.	Office of Division Engineer, B. & O. R. R.
Bott, George R., 1901, M. E. Columbus, Ohio.	Mechanical Engineer, Case M'f'g. Co.
Bower, Jerome G., 1897, M. E. Chicago, Ill.	Mechanical Salesman, Pressed Steel Car Co., Chicago.
Bradford, Joseph Nelson, 1883, M.E. Columbus, Ohio.	Professor of Architecture and Drawing, Ohio State University.
Britton, Lloyd C., 1902, C. E. Ralston, Pa.	Transitman, Susquehanna & New York Railway Company.
Brophy, James Francis, 1899, E. M. Coopers, W. Va.	Engineer for Cooper Interests in Mercer and McDowell Counties.
Brown Frederick W., 1888, E. M. Florence, Col.	Consulting Chemist and Accountant for The Portland Cement Co.
Brown, John Quincy, 1898, M. E. Oakland, Cal.	Assistant General Manager and Engineer, Oakland Transit Co., and San Francisco, Oakland & St. Jose R. R.
Brown, Newton H., 1893, E. E. Chattanooga, Tenn.	General Manager, Rapid Transit Company.
Brumley, Daniel Joseph, 1895, C.E. Elizabethtown, Kentucky.	Road Master, 1st Division, Louisville & Nashville R. R.
Bruning, Henry D., 1896, C. E. Columbus, Ohio.	Instructor in Civil Engineering, Ohio State University.
Buchenberg, Alvin E., 1900, E. E. Wauseon, Ohio.	Consulting Engineer.
Buckman, Arthur L., 1897, E. E. Toledo, Ohio.	Superintendent of Equipment, Home Telephone Company.

Burns, James Ferguson, 1891, C. E. Lebanon, Ky.	Roadmaster, Louisville & Nashville R. R.
Bygate, Harry G., 1899, M. E..... Niagara Falls, N. Y.	Assistant Superintendent, Upper Works, Pittsburg Reduction Co.

C

Calkins, George Herbert, 1895, E.E. Schenectady, N. Y.	Production Clerk, General Electric Company.
Cameron, Harry E., 1901, C. E..... Rankin, Pa.	In Designing and Estimating Dept., McClintic Marshall Construction Company.
Capron, Marshall F., 1888, M. E.. Detroit, Michigan.	Chief Mechanical Engineer, Seamless Steel Tube Co.
Carr, Hugh Stanley, 1896, E. E... Chicago, Illinois.	Engineer with the American Carbolite Company.
Carroll, Patrick Henry, 1894, E. M. Herrin, Illinois.	Superintendent, Big Muddy Coal & Iron Company.
Carson, Samuel King, 1895, E. E.. Washington, D. C.	Acting Assistant Surgeon, U. S. A.
*Catlin, Homer Clark, 1896, C. E..	Died March 10, 1902.
Cavanaugh, Andrew F., 1900, M. E. Dayton, Ohio.	Draftsman, Stillwell–Bierce & Smith–Vaile Co.
Cavin, Frank Thomas, 1902, E. E. Schenectady, N. Y.	With General Electric Company.
Cellarius, Frederick J., 1888, C. E. Dayton, Ohio.	Assistant City Engineer.
Chappell, Walter Evans, 1898, E.E. Trafford Park, Manchester, Eng.	With the British Westinghouse Electric Co., L't'd.
Cilley, Raymond, 1896, M. E...... Brooklyn, N. Y.	Chief Draftsman, Graham-Fox Motor Company.
Clarke C. J., 1899, C. E............ Columbus, Ohio.	Draftsman, City Engineer's Office.
Clarke, James Ulrick, 1902, E. E. Lancaster, Ohio.	Superintendent, Lancaster Traction Company.
Coddington, Edward F., 1896, C. E. M. Sc., 1897; 1902, Ph. D., University of Berlin. Columbus, Ohio.	Assistant Professor of Mathematics, Ohio State University.
Cole, George Nathan, 1891, E E... 265 Broadway, New York, N. Y.	Eastern Agent, Variety Manufacturing Company of Chicago.
Collins, Curtis, 1895, E. E........ San Juan, Puerto Rico.	Consulting Engineer for S. A. Luz Electrica and Rio Electric Co.
Conley, Clyde Grayson, 1902, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.
Connell, William A., 1886, E. M.. Kansas City, Missouri.	Secretary, Virginia Manganese Iron and Coal Company.
Conrad, Louis Verne, 1902, C. E... Logansport, Indiana.	Assistant on Engineers' Corps, P., C., C. & St. L. R. R.
Conway, Hugh L., 1896, C. E...... Cincinnati, Ohio.	Assistant City Engineer.
Cope, Albert N. 1897, E. E........ Columbus, Ohio.	Assistant Engineer of Construction, Columbus Railway Co.
Cosley, Harvey H., 1901, C. E..... Chicago, Illinois.	Draftsman, North Works, Illinois Steel Company.
Covell, Vernon Royce, 1895, C. E. Pittsburgh, Pa.	County Engineer's Assistant.
Crable, Arthur, 1901, C. E........ Dayton, Ohio.	Resident Engineer, Great Northern Construction Co.
*Crable, George, 1902, E. M........	Died August 6, 1902.

Cunningham, E. W., 1894, C. E. Pittsburgh, Pa.	Bridge Draftsman, Keystone Branch American Bridge Co.
Curtis, Leigh Goodrich, 1899, C. E. Garrett, Ind.	Assistant Division Engineer on Chicago Division, B. & O. R. R.

D

Damron, Carson, W., 1897, M. E. Fairmont, W. Va.	Engineer, Wagner–Palmros Manufacturing Company.
Dann, Walter M., 1902, E. E. Wilkinsburg, Pa.	With Westinghouse Electric & Manufacturing Company.
Davis, Charles William, 1894, E. M. Colorado Springs, Col., care J. McK. Ferriday & Co.	General Mining Business.
Davis, Oscar Allen, 1897, E. E. Alliance, Ohio.	Mechanical Engineer, Reeves Bros. Company.
Deahl, Walter Smith, 1896, C. E. Pittsburgh, Pa.	Draftsman, Bridge Dept., Bureau of Construction.
DeLoffre, Andre, 1896, E. E. London, E. C., England.	Electrical Engineer for General Electric Co. of America.
DeWolf, R. D., 1901, E. E. Pittsburg, Pa.	Apprentice, Westinghouse Electric & Manufacturing Company.
Denny, Charles W., 1901, E. E. New York, N. Y.	In Experimental Department, Cooper Hewitt Electric Co.
Diemer, Hugo, 1896, E. E. Lawrence, Kansas.	Associate Professor Mechanical Engineering, University of Kansas.
Dill, Raymond, 1901, E. E. Pittsburgh, Pa.	Special Apprentice Westinghouse Electric and Mnfg Co.
Donham, Maurice D., 1896, M. E. Warren, Pa.	Secretary and General Manager, Jacobson Machine Mfg Co.
Drummond, William G., 1900, M. E. Gallipolis, Ohio.	Mechanical Engineer, Ohio Hospital for Epileptics.
Dun, John J., 1883, E. M. Columbus, Ohio.	Real Estate Agent.
Dunlap, Thaddeus Cox, 1895, E. E. Columbus, Ohio.	Manager Columbus Pneumatic Tool Co.
Dunlop, Robert Rowse, 1900, E. E. Columbus, Ohio.	Electrical Engineer, Jeffrey Manufacturing Company.
Dunnick, Edward, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.

E

Erskine, James H., 1886, E.M., M.D. Albany, Oregon.	Physician and Surgeon.
Estep, Frank Leslie, 1898, E. E. Bridgeport, Conn.	Foreman Copper Rolling Mill, Bridgeport Brass Co.
Evans, Peter Platter, 1892, C. E. Osborn Building, Cleveland, Ohio.	Contracting Engineer, The Osborn Engineering Company.
Eysenbach, Ernest E., 1896, E. M. St. Paul, Minn.	Superintendent, St. Paul Gas Light Company.

F

Feicht, Russell S., 1890, E. E. East Pittsburgh, Pa.	In Engineering Department, Westinghouse Electric & Manufacturing Company.
Fergus, Guy Carleton, 1898, E. E. Zanesville, Ohio.	Partner, Zanesville Electric Co.
Fickes, Walter Morgan, 1900, E.M. (Ceramics.) Carnegie, Pa.	Manager of the Rosslyn Brick Co.

Fish, Fred Alan, 1898, E. E. Columbus, Ohio.	Assistant Professor of Electrical Engineering, Ohio State University.
Floto, Julius, 1889, E. M. St. Louis, Mo.	Agent, Brown–Ketchum Iron Works of Indianapolis.
*Flynn, Benjamin H., 1898, C. E. Columbus, Ohio.	Died March 2, 1903.
Flynn, Harry Franklin, 1892, C. E. Washington, D. C.	Assistant U. S. Coast and Geodetic Survey.
Ford, Nile Otis, 1901, E. M.; 1897, A. B.; 1900, M. S., W. & J. Hill City, South Dakota.	Engineer for the Lakota Gold Mining and Reduction Co.
Foster, Frank M., 1894, E. E. Cincinnati, Ohio.	Secretary and Treasurer, American Valve and Meter Co.
Fowler, Harry R., 1894, E. E. Toledo, Ohio.	Electrical Engineering and Contracting.
Fox, John Herbert, 1897, M. E. Cleveland, Ohio.	Mechanical Engineer Estimating & Designing Dept., The Brown Hoisting Machinery Company.
Frame, Rollo S., 1901, C. E. Silver City, New Mexico.	Civil Engineer.
Frankenberg, George T., 1902, M. E. Columbus, Ohio.	Assistant Master Mechanic, Columbus Iron & Steel Co.
Frankenburg, John T., 1899, E. E. Columbus, Ohio.	With Central Union Telephone Co.
Fravel, George B., 1888, M. E. Chicago, Ill.	Master Mechanic, Chicago Terminal Division, Penn. Lines.
Frayer, Lee Ambrose, 1896, M. E. Columbus, Ohio.	Of Frayer & Miller, Motor Cycles.
Frechtling, Arthur, 1901, M. E. Cheyenne, Wyoming.	Steam Heat Inspector, Union Pacific R. R.
Freeman, Stanton S., 1898, E. M. Parryville, Pa.	Superintendent, Carbon Iron & Steel Company.
French, Thomas Ewing, 1895, M. E. Columbus, Ohio.	Associate Professor of Architecture and Drawing, Ohio State University.
Frost, George Winfield, 1900, M. E. Columbus, Ohio.	Sales Manager, Columbus Storage Battery Company.

G

Gallen, William F., 1897, M. E. Columbus, Ohio.	Foreman of Drafting Room, Case Manufacturing Company.
Gamper, Herman, 1899, M. E. Xenia, Ohio.	Superintendent Mechanical and Electrical Dept., O. S. & S. O. Home.
Garber, John Murray, 1897, C. E. Mt. Vernon, Ohio.	Draftsman, Mt. Vernon Bridge Co.
Gee, Eugene C., 1897, E. E. San Francisco, Cal.	Special, Bell Telephone Co.
Gehrkens, Edward F., 1894, E. E. Schenectady, N. Y.	With General Electric Co.
Given, James Byron, 1896, E. E. Chicago, Illinois.	With Western Electric Company.
Goddard, Loring Hapgood, 1892, C.E. Manara, Ohio.	Farmer.
Goodell, Ralph Spencer, 1892, C. E. Mt. Vernon, Ohio.	Principal Assistant Engineer, Mt. Vernon Bridge Works.
Graham, Emery Eugene, 1898, E. E. Cleveland, Ohio.	Draftsman, Wellman-Seaver-Morgan Engineering Company.

Grate, Charles Artemus, 1898, M.E. Canton, Ohio.	With the Aultman Company.
Green, Jerome Joseph, 1893, E. E. Notre Dame, Indiana.	Professor of Physics and Electrical Engineering, University of Notre Dame.
Green, Joseph Farist, 1899, E. E. Moline, Illinois.	Electrical Engineer, M. E. Co.
Gregory, Hiram D., 1880, E. M. Covington, Ky.	Attorney-at-Law.
Griffin, Mark H., 1897, E. E. Toledo, Ohio.	Life Insurance Agent.
Groves, John Wesley, 1898, C. E. Fairfield, W. Va.	Mine Superintendent.

H

Haas, F., 1895, C. E.; 1896, E. M. Fairmount, W. Va.	Chemist, Fairmount Coal Co.
Hale, Frederick James, 1898, M. E. 1900, M. Sc. Pittsburgh, Pa.	Designing Draftsman, Westinghouse Machine Co., Gas Engine Department.
Hall, Harry R., 1889, E. M. Sault Ste Marie, Ontario, Canada.	Superintendent, Blast Furnaces, The Lake Superior Power Co.
Hammond, John Miller, 1902, C. E. Cleveland, Ohio.	Assistant on Engineer Corps, C., C,. C. & St. L. Ry.
Hance, Harry T., 1901, B. Sc., (Chem.) Columbus, Ohio.	Chemist for Ohio Coffee & Spice Company.
Hapgood Eugene P., 1902, B. Sc. (Chem.). Bingham Junction, Utah.	With United States Smelting Company.
Harkins, Robert Rusk, 1900, M. E. Cincinnati, Ohio.	Instructor in Machine Design, University of Cincinnati.
Harrison, William H., 1885, C. E. Oroya, Peru.	Engineer Scierro De Pasco Ry.
Harrop, Carl B., 1902, E. M. Bronson, Michigan.	Chemist with the Bronson Portland Cement Co.
Hartwell, Arthur, 1888, M. E. Pittsburgh, Pa.	Sales Manager, Westinghouse Electric & Manufacturing Co.
Hartwick, Louis M., 1897, M. E. Pueblo, Colorado.	Superintendent of Construction of new Blast Furnaces, C. F. & I. Company.
Hassler, Robert Hanich, 1892, E.E. Indianapolis, Indiana.	Engineer, International Motor Car Company.
Hayman, William C., 1900, E. E. Schenectady, N. Y.	Engineer, Wire & Cable Dept., General Electric Company.
Hayward, George E., 1893, C. E. Bronson, Michigan.	General Manager, The Bronson Portland Cement Company.
Hazlett, Robert Jr., 1887, C. E. Wheeling, W. Va.	Consulting Civil Engineer, and Chief Engineer, Pan Handle Traction Co.
Hebble, Charles Roy, 1896, E. E. Xenia, Ohio.	General Insurance Agent.
Heller, Albert Henry, 1890, C. E. Columbus, Ohio.	Professor of Bridge Engineering, Ohio State University.
Henderson, Adelbert A., 1898, C. E. Pittsburgh, Pa.	Transitman, County Engineer.
Henretta, Charles M., 1896, E. M. Fernie, B. C.	Mining Engineer, Canadian Pacific Railway.
Hertner, John Henry, 1899, E. E. Cleveland, Ohio.	Of Hertner Electric Company.

Hewitt, Strafford R., 1898, E. E. Central City, Kentucky.	Engineer for Central Coal & Iron Company.
Hine, Lucius A., 1888, E. M. Chicago, Illinois.	President and Treasurer, Hine-Watt Manufacturing Company.
Hipple, John Merton, 1898, E. E. Pittsburg, Pa.	Engineer, Westinghouse Electric & Manufacturing Company.
Hirsch, Gustav, 1897, E. E. Detroit, Michigan.	General Superintendent, People's Telephone Company.
Hitch, James Frank, 1902, C. E. Galion, Ohio.	With Engineering Corps, C., C., C. & St. L. R. R.
Holbrook, George Fred., 1902, E. M. San Bernardino, Cal.	Surveyor.
Homan, Frank, 1895, C. E. Batavia, Ohio.	Civil Engineer.
Howald, Ferdinand, 1878, B. Sc.; 1881, E. M. Rush Run, Fayette Co., W. Va.	Coal Operator.
Howells, E. S., 1884, E. M. Birmingham, Alabama.	General Manager, Howells & Jones (coal firm).
Howells, Thomas J., 1897, E. M. Bluefield, W. Va.	Chemist in Pocahontas coal field for National Steel Co.
Huddleson, Frank N., 1902, E. M. Columbus, Ohio.	Chemist, National Steel Company.
Hull, Walter A., 1902, E. M. (Cer.) Bolivar, Pa.	Chemist, Reese Hammond Fire Brick Co.
Hunt, William F., 1887, M. E.; 1895, LL. D.; 1896, LL. M. (Univ. of Minn.) St. Paul, Minn.	Attorney-at-Law.
Hunter, Madone C., 1900, E. E. Columbus, Ohio.	Electrical Engineer, Kilbourne & Jacobs Mfg. Co.
Huntington, Arthur, 1899, M. E. Chicago, Illinois.	Engineer with Westinghouse Electric & Mfg. Co.
Hyle, Charles A., 1896, E. E. Oklahoma, O. T.	Observer U. S. Weather Bureau.

I

Ireland, Guy L., 1895, M. E.	
Irvin, Chadwick H., 1897, M. E. Pueblo, Colorado.	Draftsman, Colorado Fuel & Iron Company.

J

Jenkins, William G., 1893, C. E. Bellefontaine, Ohio.	Draftsman, The Bellefontaine Bridge & Iron Company.
Jenkins, Willis H., 1894, C. E. Sheridanville, Pa.	Transitman, Pennsylvania Lines West of Pittsburg.
Jennings, Levi E., 1897, E. E. Dayton, Ohio.	With R. E. Kline, Consulting Engineer.
Johnson, Charles W., 1896, E. E. Cincinnati, Ohio.	Production Manager, Bullock Electric Manufacturing Co.
Johnson, Earl Stinson, 1900, E. E. Schenectady, N. Y.	In Testing Department, General Electric Company.
Johnson, Walter A., 1902, M. E. Indianapolis, Ind.	Special Apprentice, Pennsylvania R. R.
Johnston, George E., 1892, C. E. Louisville, Kentucky.	Assistant Engineer, L. & N. R. R. Company.

Johnston, Herbert L., 1892, E. E.. Troy, Ohio.	Manufacturer of Electric Machinery.
*Jones, A. A., 1886, C. E..........	Died May, 1894.
Jones, Arthur James, 1898, E. E... East Pittsburgh, Pa.	With Westinghouse Electric & Manufacturing Company.
Jones, Alexander H., 1895, E. E.... St. Louis, Mo.	Consulting Engineer.
Jones, Pearl N., 1892, E. E........ Wilkinsburg, Pa.	Engineer and Salesman, Westinghouse Electric & Mfg. Co.
Jones, Smilie, 1894, E. M..........	
Judd, H., 1897, M.E.; 1899, M. Sc... Columbus, Ohio.	Assistant Professor in Experimental Engineering, Ohio State University.

K

Kanmacher, Samuel H., 1900, E. E. Schenectady, N. Y.	Engineer, Power & Mining Eng. Dept., General Electric Co.
Keating, Harvey T., 1902, B. Sc. (Chem.). New York, N. Y.	Student at Columbia University.
Keffer, Frederick, 1882, E. M...... Anaconda, British Columbia.	General Manager, the British Columbia Copper Co., Ltd.
Kemmler, Edward A., 1888, C. E... Columbus, Ohio.	Assistant City Engineer.
Kern, William F., 1902, B. Sc. (Chem.) Columbus, Ohio.	Chemist, Buckeye Malleable Iron & Coupler Company.
Kerr, Samuel Thompson, 1894, E.E. Martins Ferry, Ohio.	Superintendent Municipal Electric Light Plant.
Kester, Frederick Edward, 1895, E. E.; 1899, A. M. (Cornell.) Columbus, Ohio.	Assistant Professor of Physics, Ohio State University.
Kettler, Frank C., 1901, C. E...... Chicago, Illinois.	In North Works, Illinois Steel Co.
Kiesewetter, L. F., 1891, C. E.; 1892, A. B. and 1893, A. M. (Harv.) Columbus, Ohio.	Cashier, The Ohio National Bank.
King, Herbert S., 1901, C. E...... Buckhannon, W. Va.	Assistant Engineer, Belington and Northern R. R. Co.
King, Roy Stevenson, 1902, M. E.. Dayton, Ohio.	With National Cash Register Co.
Kline, Charles H., 1897, E. E..... Dayton, Ohio.	Civil Engineer, with R. E. Kline, Consulting Engineer.
Knecht, Arthur E., 1898, M. E.... Cincinnati, Ohio.	Mechanical Engineer, Cincinnati Screw and Tap Co.
Knight, William Abner, 1900, M.E. Columbus, Ohio.	Assistant Professor of Machine-Shop Practice, Ohio State University.
Knox, Frank S., Jr., 1900, E. M... Sayre, Ohio.	Engineer, New England Coal Co., San Toy, Ohio.
Krumm, Louis Ralph, 1898, E. E.. Columbus, Ga.	Engineer, Southern Telephone Company.
Krumm, Thomas Zettler, 1902, C.E. Waverly, Iowa.	Transitman, C. & G. W. R. R.
Kuhn, Vallie Howard, 1896, E. E.. Etna, Ohio.	Machinist.

L

Lamb, Whitney Earl, 1900, E. E. Schenectady, N. Y.	In Testing Department, General Electric Company.
Lamme, Benjamin G., 1888, M. E. Pittsburgh, Pa.	Assistant Chief Engineer, Westinghouse Electrical & Manufacturing Company.
Lamme, Bertha A., 1893, E. E. Pittsburgh, Pa.	With Westinghouse Electric & Manufacturing Company.
Large, Joseph H., 1890, C. E. Massillon, Ohio.	Draftsman, Massillon Bridge Company.
Lee, Corliss Edgar, 1900, E. E. Schenectady, N. Y.	With General Electric Company.
Lee, Robert M., 1897, M. E. Washington, D. C.	Draftsman, Ordinance Department, U. S. Army.
Lesh, John Howard, 1901, M. E. Cleveland, Ohio.	Check Draftsman, Garry Iron & Steel Company.
Levering, Orpheus D., 1893, M. E. Columbus, Ohio.	Foreman of Tool Room, Columbus Machine Company.
Lincoln, Paul M., 1892, E. E. Pittsburgh, Pa.	Electrical Engineer, Westinghouse Electric & Manufacturing Co.
*Lindo, William C., 1896, C. E.	Died, 1900.
Linebaugh, Jesse Joseph, 1899, E. E. Schenectady, N. Y.	Electrical Engineer, Testing Department, General Electric Co.
Linville, C. P., 1900, B. Sc. (Chem.), 1902, A. M. Jackson, Ohio.	Chemist for Globe Iron Company.
Logan, Lavallette L., 1896, E. M. Robertsdale, Pa.	General Manager, Rockhill Iron & Coal Company.
Lott, Charles Milford, 1895, E. E. Hicksville, Ohio.	Proprietor and Superintendent of Hicksville Electric Light Plant.
Lovejoy, Ellis, 1885, E. M. New Lexington, Ohio.	General Manager, Imperial Clay Company.
Lyon, Arthur H., 1900, M. E. Bucyrus, Ohio.	Works Manager, New York Blower Company.

M

Manley, Rush Emmett, 1894, E. E. Columbus, Ohio.	Chief Inspector, Central Union Telephone Company.
Marckworth, Otto S., 1901, B. Sc. (Chem.). Columbus, Ohio.	Manager, Ohio Testing Laboratory.
Marquard, Frank F., 1896, C. E. Sharon, Pa.	Superintendent, The Sharon Coke Company.
Marshall, Willard B., 1900, E. E. Chicago, Illinois.	
Martin, George, 1897, E. E. Youngstown, Ohio.	Wire Chief, Central Union Telephone Co.
Martin, John D.,1901, M. E. Dennison, Ohio.	Special Apprentice, P., C., C. & St. L. Ry. Shops.
Martin, Percy, 1892, E. E. Coventry, England.	General Manager, Daimler Motor Company.
Marvin, Charles F., 1883, M. E. Washington, D. C.	Professor of Meteorology, in Charge Instrument Division, U. S. Weather Bureau.
Masters, George Albert, 1886, C. E. Topeka, Kansas.	Assistant Bridge Engineer, A. T. & S. F. Ry System.
Matson, William Edgar, 1896, E. E. Lynn, Massachusetts.	In Production Department, General Electric Company.

McAllen, William J., 1894, C. E. Chicago, Illinois.	Civil Engineer, Structural Department, North Works, Illinois Steel Company.
McCarter, Robert D., Jr., 1895, E. E. London, E. C., England.	Manager and Engineer, Bath Electric Tramway Ltd.
McCormick, John H., 1880, M. E. Columbus, Ohio.	Mechanical Engineer.
McCormick, William F., 1896, M. E. Columbus, Ohio.	
McFarland, Horace M., 1902, E. M. Dayton, Tenn.	Mining Engineer with Dayton Coal & Iron Company.
McGrew, John A., 1895, C. E. Pittsburg, Pa.	Engineer, M. of W. Pennsylvania Company, Eastern Division.
McGuffey, Francis H., 1894, E. E. Columbus, Ohio.	Clerk in Railway Mail Service.
McIntire, Alfred Heber, 1898, E. E.; 1900, M. E. Care of McIntire & McIntire, Mt. Vernon, Ohio.	
McIntosh, Roscoe E., 1902, E. E. Schenectady, N. Y.	With General Electric Company.
McKeon, Robert Dale, 1902, C. E. Logansport, Ind.	Assistant on Engineers' Corps, Logansport Div., P., C., C. & St. L.
McNary, George B., Jr., 1896, E. E. Toledo, Ohio.	Purchasing Agent, F. Bissell Company.
Melick, Neal A., 1900, C. E. New York, N. Y.	Assistant Engineer, N. Y., C. & H. R. R. R.
Menough, Arthur G., 1894, E. M. Wellsville, Ohio.	Secretary and Treasurer, Menough Iron & Steel Foundry Company.
Mercer, Frank Emmett, 1896, E. E.	
Merrill, Ernest Martin, 1902, C.E. Beckley, W. Va.	Draftsman, with the Deepwater Railway.
Mershon, Ralph D., 1890, M. E. New York City.	Consulting Engineer.
Miller, Albert Arthur, 1902, C. E. Baltimore, Md.	Assistant Engineer to Chief Engineer, Maintenance of Way, B. & O. R. R.
Miller Frank Case, 1893, C. E. Sacramento, Cal.	Resident Engineer, Sacramento Division, Southern Pacific Ry. Co.
Miller, Henry F., 1889, M. E. 345 E. State St., Columbus, Ohio.	Consulting Engineer.
Miller, Ralph C., 1901, C. E. Pittsburgh, Pa.	In Maintainance of Way Department, Pittsburgh Division, P., C., C. & St. L. Ry.
Morris, Clyde Tucker, 1898, C. E. Seattle, Wash.	Principal Assistant Engineer, Puget Sound Bridge & Dredging Company.
Morris, Robert H., 1901, E. M. Congo, Ohio.	Engineer Congo Coal and Mining Company.
Morris, William Blaine, 1902, M.E. Mt. Vernon, Ohio.	Draftsman, with C. & G. Cooper Company.
Morrison, Robert O., 1893, C. E. Pittsburgh, Pa.	Assistant on Engineer Corps, Eastern Div., P., Ft. W. & C. R. R.
Morton, George L., 1884, M. E. Washington, D. C.	Principal Examiner, Instruments of Precision, U. S. Patent Office.
Munn, Mortimer Adam, 1894, C. E. Cleveland, Ohio.	Civil Engineer, with E. P. Roberts & Company.
Myers, Albert B., 1900, E. M. San Luis Potosi, Mexico.	Consulting Engineer, Compania Metalurgica Mexicana.

Myers, Ord, 1895, E. E. New York City.	Electrician, Metropolitan Street Railway Company.
Myers, Roy V., 1893, C. E. Dayton, Tennessee.	Superintendent Mines, Dayton Coal & Iron Co. Ltd.
Myers, Uriah H., 1887, E. M. Pittsburg, Pa.	Printer and Stationer.

N

Nagel, William G., 1895, M. E. Toledo, Ohio.	President and Manager, W. G. Nagel Electric Company.
Nauss, Ralph W., 1901, B. Sc. (Chem.). Columbus, Ohio.	Student, Northwestern University Medical School.
Needham, Harry S., 1900, M. E. Indianapolis, Ind.	Special Apprentice, Pennsylvania R. R.
Newton, Samuel Donald, 1895, C.E. Knoxville, Tenn.	Civil Engineer, Southern Railway.
Nicholson, Charles M., 1900, E. E. Cincinnati, Ohio.	Foreman of Testing Dept, Bullock Electrical Mfg. Co.
Nidy, Herbert C., 1901, E. E. Schenectady, N. Y.	With General Electric Company.
Nold, John H., 1900, E. M. Columbus, Ohio.	Mine Engineer, Assistant to F. A. Ray.
Nurian, Kerson, 1899, M. E. St. Louis, Mo.	Engineer, Mechanical and Electrical Department, St. Louis World's Fair.

O

O'Brine, David, 1881, B. Sc., M. Sc.; 1882, E. M., D. Sc., M. D. Urbana, Ohio.	Physician and Surgeon.
Orton, Edward, Jr., 1884, E. M. Columbus, Ohio.	Professor of Ceramics, Ohio State University, State Geologist of Ohio.

P

Pabodie, Robert Jewett, 1899, M. E. Philadelphia, Pa.	Mechanical Engineer, Bureau of Filtration.
Palmer, Walter K., 1893, M. E. Kansas City, Mo.	Consulting Mechanical and Electrical Engineer.
Parrett, Benjamin C., 1902, B. Sc. (Chem.). Allegheny, Pa.	Chemist, Allegheny Steel & Iron Company.
Patch, Homer Austin, 1896, C. E. Minneapolis, Minn.	Draftsman, Minneapolis Steel & Machinery Co.
Payne, Halbert Edwin, 1887, M. E. New York City.	President American Typewriter Company.
Pearl, Allen Sexton, 1894, E. E. Chicago, Illinois.	Ohio Representative of Central Electric Company, Chicago, Ill.
Pedlow, Edward B., 1893, C. E. New Straitsville, Ohio.	General Superintendent, C. & H. C. & I. Co.
Peirce, John Mattison, 1895, E. E. South Charleston, Ohio.	In Telephone Work.
*Pence, David Arrel, 1894, M. E.	Died, December 15, 1901.
Peppel, Samuel V., 1899, B. Sc. (Chem.). Columbus, Ohio.	Chemist, Ohio Geological Survey.
Peters, William L., 1885, M. E. Riverside, California.	Horticulturist.

*Pilcher, Hastings M., 1895, E. E..	Died March 14, 1902.
Pleukharp, Rev. C. V., 1885, M. E. La Crescenta, Cal.	Clergyman.
Polk, Walter C., 1895, C. E........ Kansas City, Mo.	Engineer, Central Construction Co.
Postle, Herman R., 1894, C. E..... Columbus, Ohio.	Teacher in Columbus North High School.
Poto, Frank B., 1901, B. Sc. (Chem.) Columbus, Ohio.	Chemist, National Steel Co.
Powell, Charles S., 1893, E. E..... London, E. C., England.	Assistant Manager, British Westinghouse Electric & Manufacturing Company.
Pratt, Fred Kellogg, 1900, C. E.... Cleveland, Ohio.	Engineer, Wheeling & Lake Erie R. R.

R

Rawson, Levi, 1899, C. E.......... Sistersville, W. Va.	Engineer, Carter Oil Company.
Ray, Frank A., 1887, E. M........ 137 King Avenue, Columbus, Ohio.	Professor of Mine Engineering, Ohio State University.
Ray, William M., 1893, C. E....... Cleveland, Ohio.	Assistant Engineer, B. & O. R. R. Company.
Raymond, Coles Abel, 1894, C. E.. Toledo, Ohio.	Draftsman, American Bridge Co.
Reed, Robert Browning, 1896, E. E. Ft. Wayne, Ind.	Engineer, Ft. Wayne Electric Works.
Reed, William Allen, 1897, E. M.. Telluride, Colorado.	Mining Engineer, Liberty Bell Gold Mining Company.
*Reeves, Archibald C., 1887, C. E..	Died, October 2, 1902.
Rice, Herbert A., 1897, C. E....... So. Bethlehem, Pa.	Instructor in Civil Engineering, Lehigh University.
Riddle, Howard Sterling, 1897, E. E. Akron, Ohio.	Mechanical Engineer, The Diamond Rubber Company.
Rightmire, Robert E., 1902, M. E.. Columbus, Ohio.	Special Apprentice, Hocking Valley Railway Company.
Roberts, Cyrus Swan, 1898, E. M.. Santa Barbara, Chihuahua, Mexico.	Chief Engineer and Assistant Superintendent of Montezuma Lead Company.
Robinson, Erdis Geroska, 1893, C. E. Columbus, Ohio.	Secretary and Treasurer, Robinson-Tilton Mach'y Co.
Rogers, James Bertrand, 1896, E.M. Leetonia, Ohio.	Assistant Superintendent, Salem Iron Company.
Root, Willis J., 1885, E. M........ Columbus, Ohio.	General Superintendent, National Steel Co., Columbus Works.
Rowlee, Henry A., 1897, M. E..... Philadelphia, Pa.	Inspector, Ordinance, U. S. Army.
Ruhlen, Carl Marble, 1898, M. E. Port Townsend, Wash.	Draftsman, Quartermaster's Dept., U. S. Army.
Ryland, Paul D., 1901, C. E...... Pittsburgh, Pa.	Assistant on Engineers' Corps, Maintainance of Way Dept., Eastern Division, P., Ft. W. & C. R. R.

S

Schaub, Edward L. T., 1885, M. E. Columbus, Ohio.	Draftsman, Jeffrey M'f'g. Company.
Schaup, Charles E., 1897, E. M....	

Scheibel, William O., 1888, E. M. Columbus, Ohio.	General Manager, The American Art Tile Company.
Schreiber, George Ernst, 1900, E. E. Kansas City, Mo.	Electrical Engineer, with Ford, Bacon & Davis, Engineers.
Schreiber, John Martin, 1899, E. E. Cleveland, Ohio.	In Engineering Department, Cleveland Electric Street Railway.
Schroll, Otto, 1886, C. E. Richmond, Indiana.	Superintendent, Richmond Division, P., C., C. & St. L. R. R
Schwab, Frank W., 1902, B. Sc., (Chem.). Newcomerstown, Ohio.	Chemist, James B. Clow & Sons.
Sedgwick, Edgab S., 1895, E. E. Columbus, Ohio.	Chief Engineer, The Case Manufacturing Company.
Senter, Herbert Pike, 1902, C. E. Ft. Wayne, Ind.	Assistant on Engineer Corps, Pennsylvania Lines.
Serva, Adam A., 1893, E. E. Ft. Wayne, Indiana.	Assistant Sales Manager and Assistant Secretary, Ft. Wayne Electric Works.
Sharp, Charles C., 1888, C. E. Boomer, W. Va.	President, Raven Coal and Coke Co.; and Superintendent, Boomer Coal and Coke Co.
Shepherd, Charles W., 1900, C. E. Chicago, Illinois.	In North Works, Illinois Steel Company.
Sherman, Chris. E., 1894, C. E. Columbus, Ohio.	Professor of Civil Engineering, Ohio State University.
Sherman, John K., 1901, C. E. Pittsburgh, Pa.	Assistant on Engineer Corps, Southwest System Pennsylvania Lines, west of Pittsburgh.
Simonton, Mark, 1895, E. E. Columbus, Ohio.	Treasurer and General Manager, Electric Supply & Construction Company.
Skinner, Charles E., 1890 M. E. Pittsburgh, Pa.	Engineer, Electrical Engineering Department, Westinghouse Electric and Manufacturing Co.
Smith, David William, 1899, C. E. Columbus, Ohio.	Assistant Engineer, Hocking Valley Ry. Co.
Smith, Harry Ford, 1902, M. E. Lexington, Ohio.	Manager, Electric Light Plant.
Snider, Charles M., 1897, B.Sc.(I.A.) Columbus, Ohio.	Draftsman, The Jeffrey Mfg. Co.
Sperr, Frederick W., 1883, E. M. Houghton, Mich.	Professor of Civil and Mining Engineering, Michigan College of Mines.
Sprague, Clarence M., 1899, C. E. Pittsburgh, Pa.	Assistant on Engineering Corps, P., C., C. & St. L. Ry., Pittsburgh Division.
Sproat, Amasa Delano, 1902, E. M. San Luis Potosi, Mexico.	Assistant Chemist, Campania Metalurgica Mexicana.
Spurrier, John Rudolph, 1896, E. E. Manchester, England.	Foreman Detail Division, Mechanical Department, British Westinghouse Electric and Mfg. Co.
Staley, Marcellus, 1899, E. E. New York, N. Y.	Firm of Staley & Gillespie, Electrical Contractors.
Starbuck, Daniel Karl, 1899, E. E. Flagship Chicago, U. S. N.	Chief Electrician.
Stewart, Hartford T., 1896, E. E. Columbus, Ohio.	Agent, General Electric Company.
Stewart, Lee Raymond, 1896, C. E. Camden. New Jersey.	Engineer in Charge of Mould Loft, New York Ship Building Co.

Stinebaugh, Isaac Long, 1892, C. E. Rockaway, Ohio.	Surveyor and Civil Engineer.
Stocker, James Arthur, 1902, C. E. Charleston, W. Va.	Assistant Engineer on Kanawha & Michigan Railway.
Stone, Carleton Elijah, 1899, C. E. Cincinnati, Ohio.	Junior Civil Engineer, U. S. Engineer Department.
Stone, Thomas Wade, 1902, M. E. Ft. Wayne, Indiana.	Chief Draftsman, Western Gas Construction Co.
Storer, Norman Wilson, 1891, E. E. Pittsburg, Pa.	Westinghouse Electric & Manufacturing Company.
Storer, Simon B., 1893, E. E. Syracuse, N. Y.	Engineer and Salesman, Westinghouse Electric & Manufacturing Company.
Stull, Emmett Willett, 1894, E. E. Pittsfield, Mass.	With Stanley Electric Company.
Stull, Raymond Thomas, 1902, E.M. (Ceramics). Terra Cotta, Ill.	Chemist for American Terra Cotta & Ceramic Company.
*Stump, John William, 1895, C. E.	Died, May 31, 1900.

T

Tanner, Edward Wood, 1902, M. E. Canton, Ohio.	Draftsman, with the Aultman Co.
Taylor, Arthur W., 1893, E. M. Cleveland, Ohio.	Chemist, Otis Steel Company, Ltd.
Thomas, James O., 1897, C. E. Columbus, Ohio.	Wire Chief, Central Union Telephone Company.
Tomlinson, James Rowe, 1892, C. E. Chillicothe, Ohio.	
Towne, Robert S., 1879, B. Sc.; 1880, E. M. New York City.	Mining Engineer.
Tufts, Charles Hill, 1899, E. M. Pittsburg, Pa.	Chief Chemist, Shoenberger Wks., American Steel and Wire Co.
Turner, Arthur M., 1893, E. E. 281 Oak St., Chicago, Ill.	

U

Urban, Harry M., 1898, C. E. Wheeling, W. Va.	Department Engineer, National Tube Co., Riverside Dept.

V

Van Dyke, Clifford S., 1902, E. E. Ansonia, Ohio.	Merchant.
Vandervoort, W. P., 1886, E. M.	
Viets, Willis B., 1886, E. M. Parryville, Carbon Co., Pa.	Chemist, Carbon Iron & Steel Co., Ltd.
Vosskuehler, Joseph H., 1900, M.E. Columbus, Ohio.	Instructor in Architecture and Drawing, Ohio State University.

W

Wadsworth, F. L. O., 1888, E. M.; 1889, B. Sc., M. E. Allegheny, Pa.	Director Allegheny Observatory.
Walker, James Madison, 1896, C.E. Harrisville, Ohio.	Resident Engineer, W. & L. E. R. R.
Watt, Sern P., 1886, M. E. Morgan Park, Illinois.	Designer and Mechanical Expert, Hine-Watt Manufacturing Company, Chicago, Ill.

Webber, Fred C., 1901, B. Sc. (Chem.) Washington, D. C.	Bureau of Chemistry, U. S. Agricultural Dept.
Weick, C. W., 1898, B. Sc. (I. A.).. New York, N. Y.	Instructor in Manual Training, Teachers' College, Columbia University.
Welch, Clark J., 1888, C. E........ 11 Broadway, New York, N. Y.	Bridge and Structural Engineer.
Welch, Oliver Bartlett, 1895, E. E. P. O. Box 1618, Pittsburgh, Pa.	Mechanical Engineer.
Wilcox, Alva Newton, 1895, E. E.. Dayton, Ohio.	The Pinneo and Daniels Co.
Wellbaum, Arvy E., 1902, M. E.... Springfield, Ohio.	Draftsman, Foos M'f'g. Company.
Williams, Harry E., 1902, M. E... Omaha, Neb.	Special Apprentice, Union Pacific R. R. Shops.
Williamson, Homer D., 1901, B. Sc. (Chem.). Columbus, Ohio.	Chemist with Ohio State Board of Health and Starling Medical College.
Wirthwein, Louis P., 1899, C. E.. Columbus, Ohio.	Assistant City Engineer.
Wise, Albert Joseph, 1898, C. E.... Houston, Texas.	Civil Engineer.
Wolf, Herman Howard, 1895, C. E. Washington, D. C.	Lieutenant, U. S. Revenue Cutter Service.
Wynne, Francis Edmond, 1902, E.E. Wilkinsburg, Pa.	With Westinghouse Electric & Manufacturing Company.

Y

Yost, Lloyd, 1902, M. E............ Columbus, Ohio.	Fellow in Mechanical Engineering, Ohio State University.

Z

Zaumseil, Oscar C., 1887, C. E..... Webb City, Mo.	Merchant.
Zurfluh, William N., 1894, E. E.. Springfield, Ohio.	Superintendent, Home Lighting, Power and Heating Company.

List of Graduates from Other Colleges of the Ohio State University Who are now doing Engineering Work.

Bradford, Ernest, 1892, G. Ph.... Columbus, Ohio.	Superintendent and Metallurgist, Pioneer Stove Company.
Calkins, William B., 1898, G. Ph. Denver, Colorado.	Chemist for Denver Gas & Electric Company.
Converse, Howard P., 1887, B. Sc.. Boston, Mass.	Of H. P. Converse & Co., Contractors in Iron and Steel.
Evans, Ernest, 1892, B. Sc........ Zanesville, Ohio.	Superintendent National Steel Co.
Fischer, Robert, 1895, G. Ph.; 1896, M. Ph.; 1898, B. Sc. Newport, Del.	Chemist, Krebs Pigment & Chemical Company.
Heath, Arthur T., 1887, G. Ph... Oak Harbor, Ohio.	Analytical Chemist, Consulting Engineer and Contractor.
Humphrey, J. Scott, 1879, B. Sc.. Indianapolis, Indiana.	Assistant City Civil Engineer.
Jones, Jesse Lee, 1890, B. A........ Philadelphia, Pa.	In charge of Testing Department, William Cramp & Sons, Ship Builders.
Kirker, Harry L., 1889, B. Sc.... London, England.	Electrical Engineer, Westinghouse Electric & Manufacturing Company.
Knopf, George W., 1883, B. Sc...... Pottstown, Pa.	Engineer, McClintic-Marshall Construction Company.
Lewis, Thomas K., 1894, B. Sc..... Columbus, Ohio.	Instructor, Department of Architecture and Drawing, Ohio State University.
Lovejoy, Jesse R., 1884, B. Sc...... Schenectady, N. Y.	Manager, Lighting, Railway and Supply Department, General Electric Company.
McDowell, John A., 1882, B. Sc... Columbus, Ohio.	Chemist, Specialty Portland Cement Manufacture. Mine Examiner.
Mix, Edgar W., 1888, B. Sc........ Paris, France.	Chief Engineer, La Societe des Etablissement Postel-Vinay et La Cie Francaise Thompson-Houston
Moyer, Henry E., 1893, B. Sc...... Youngstown, Ohio.	Chief Chemist, Youngstown Steel Company.
Newton, Harry S., 1889, B. Sc..... Warhouse Point, Conn.	General Superintendent, Hartford and Springfield St. Ry. Co.
Phelps, Cyrus Alba, 1892, B. Sc... Chalchihuites, Mexico.	Treasurer, Cia Minera "Huiriachie," S. A.
Ritchey, Joseph C., 1890, B. Sc.... Cleveland, Ohio.	Chemist, American Works, A. S. & W Co.
Scott, Charles Felton, 1885, B. A. Pittsburg, Pa.	Chief Electrian, Westinghouse Electric & Manufacturing Co.
Somermeier, Edward E., 1898, G. Ph. Ohio State University.	Instructor in Metallurgy, Ohio State University.
Ward, John C., 1880, B. A......... Painesville, Ohio.	County Engineer and Surveyor.
Wikoff, John Burkett, 1884, B. Ph. Cleveland, Ohio.	Secretary and Treasurer, Imperial Clay Co., New Lexington, O.

Directory of Those Who have Completed Short Courses

ARCHITECTURE.

Elliott, Emmett F., 1901 Johnstown, Pa.	
Gleichauf, Frank S., 1901 Columbus, Ohio.	Draftsman, Richards, McCarty & Bulford, Architects.
Howard, Oscar D., 1902 Columbus, Ohio.	Architectural Draftsman.
Miller, Charles E., 1900 Akron, Ohio.	Draftsman, Diamond Rubber Co.

CERAMICS.

Adams, John Carroll, 1897 Lynchburg, Va.	Manager of Brickyard.
Berkey, Leslie Reese, 1899 Bolivar, Pa.	Foreman, No. 4 Works, Reese, Hammond & Co., Fire-Brick Makers.
Bleininger, Albert V., 1897; 1901, B. Sc., (Chem.). Columbus, Ohio.	Instructor in Ceramics, Ohio State University.
Braddock, Everett F., 1896	
Campbell, Augustine Ray, 1898 Tottenville, S. I., New York.	Chemist, Atlantic Terra Cotta Co.
Colgan, Frank J., 1901 Grassy Point, N. Y.	With A. M. & W. H. Wiles Co.
Gates, Ellis D., 1901 Chicago, Illinois.	Treasurer, American Terra Cotta & Ceramic Co.
Giessen, Carl, 1896 Canton, Ohio.	
Gorton, Elmer Ellsworth, 1896 Croton on Hudson, New York.	
Hensel, Otto, 1897 New Lexington, Ohio.	With Imperial Clay Company.
Ittner, Warren Wayne, 1899 Bellville, Illinois.	Superintendent of the Anthony Ittner Brick Company.
Jones, Edward J., 1896 Covington, Ky.	Ceramic Chemist, Cambridge Tile Manufacturing Company.
Morrison, Frank H., 1901 Denver, Col.	President and General Manager, Denver Electrical Porcelain Co.
Post, Malcolm Phelps, 1899 St. Louis, Mo.	Foreman, Blackmer–Post Pipe Co.
Purdy, Ross C., 1898 Columbus, Ohio.	
Sandison, Jack Morrison, 1902 Moberly, Mo.	Assistant Manager, Moberly Brick, T. & E. Co.
Singer, Louis Parmelee, 1902 Columbus, Ohio.	Advanced Student in Ceramics Department, Ohio State University.
Thomas, David C., 1896 Wellsville, Ohio.	Chemist and Head Burner, U. S. Pottery Company.
Watts, Arthur S., 1901 Columbus, Ohio.	With Bell Pottery Company.
Wolfley, John W., 1896 Mt. Gilead, Ohio.	Superintendent, Johnson-Wolfley Pottery Company.

Worcester, Wolsey G., 1899........ Ceramist.
Columbus, Ohio.

INDUSTRIAL ARTS.

Benbow, James D., 1901............ Draftsman, Kilbourne, Jacobs Mfg. Company.
Columbus, Ohio.

MINING.

Anderson, Arthur, 1898.
Athens, Ohio.

Blower, J. W., 1892.
Mine Manager, Trimble, Ohio.

Bohm, Oscar Herman, 1899.
Cleveland, Ohio.

Boyd, Arthur, 1893.
Mine Surveyor, Saginaw, Mich.

Brophy, John S., 1898.
Frostburg, Md.

Carroll, P. H., 1891; 1894, E. M.
Herrin, Illinois.

Dixon, C. F., 1890.

Evans, John M., 1895.

Evans, William, 1902.
Engineer Superior Coal Co., Wellston, Ohio.

Fyfe, John, 1891.

Gildroy, R. E., 1891.

Harrigan, Archer, 1899.
Mining Engineer, Sun, W. Va.

Harrigan, Patrick, 1898.
Supt. Congo Coal and Mining Co., Congo, Ohio.

Herron, J. S., 1893.

Jenkins, Jonathan, 1891.
Mine Foreman, Lord, Md.

King, Francis E., 1900.
Supt. Pittsburg Terminal R. R. & Coal Co., Castle Shannon, Pa.

Laviers, Henry, 1893.
Engineer Superior Coal Co., Wellston, Ohio.

Lochrie, John, 1890.
Gen. Mine Supt., Windber, Pa.

McKay, R. F., 1894.
Superintendent and Engineer Freeport Smokeless Coal Co.

Moss, James, 1891.
Supt. and Mining Engineer, Buffalo, Ohio.

Newton, E. A., 1893.
Philadelphia, Pa.

Nichols, J. L. D., 1895.

Oakes, C. H., Jr., 1892.
Supt. Mines, Leesburg, Pa.

Phillips, F. R., 1893.

Quigley, John, 1893.
Mine Foreman, Snow Shoe, Pa.

Quigley, Robert, 1894.
Mine Foreman, Burnside, Pa.

Quinn, John, 1891.
Civil and Mining Engineer, Houtzdale, Pa.

Ralston, William, 1896.
Cleveland, Ohio.

Rees, David, 1891.
Asst. Mngr. Empire State, Idaho M. & D. Co., Wardner, Idaho.

Rees, Evan, 1895.
Mining Engineer The Tom Corwin Coal Co., Wellston, Ohio.

Siddall, J. W., 1901.
Mine Engineer Oliver Iron and Mining Co., Mt. Zion, Minn.

Snedden, James, 1892.

Tetlow, W. A., 1892.
Salem, Ohio.

Thompson, Thomas, 1902.
Mine Foreman, Modoc, Ohio.

Wright, John, 1892.
Mine Foreman, Pottersdale, Pa.

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